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ABSTRACT

Research findings concerning a class of rational strategies that emphasize linking schools with outside knowledge and expertise are summarized, with special attention given to findings from five recent or soon-to-be-completed studies. This report consolidates, organizes, and interprets the quantitative research evidence concerning the roles, activities, job contexts, and effects of external linking agents and agencies on school improvement outcomes, and examines the role of the external linking agent in terms of a larger set of internal and external factors that affect these outcomes. Five issues are addressed specifically: (1) recent research findings implications concerning linking agents; (2) linking agent roles in actual practice; (3) evidence concerning the effects and outcomes of linking agents' efforts; (4) implications of recent studies for the selection, training, and support of linking agents; and (5) study implications for the initiation, continuation, or modification of efforts employing linking agents to improve United States schools in the 1980's. An eight-page reference list, a four-page bibliography, and an additional publication list for DESSI (A Study of Dissemination Efforts Supporting School Improvement) publications are included. (Author/LMM)

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THE ROLE OF LINKING AGENTS IN SCHOOL IMPROVEMENT:
A REVIEW, ANALYSIS, AND SYNTHESIS OF RECENT MAJOR STUDIES

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December 1982

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DEDICATION

This publication is dedicated to the many persons who shared in the vision and belief that schools in the United States could be improved by creating and refining arrangements for linking schools with external sources of knowledge and assistance. Among the pioneer visionaries was Thomas Clemens who, first at the U. S. Office of Education and then at the National Institute of Education, championed the idea that an educational extension system comparable to that found in the Cooperative Extension Service of the U. S. Department of Agriculture could and should be created in the field of education. First by supporting the monumental research review and synthesis performed by Ronald Havelock, which provided the conceptual foundation for linking agents and linking systems, and then by sponsoring the field test and evaluation of the Pilot State Dissemination Project, Clemens and his colleagues at USOE and NIE supported much of the early research, development, and evaluation work that laid the technical foundation and provided the justification for the State Dissemination Grants Program and for many other educational linking agent systems.

Other remarkable idea champions were Lee Wickline and Jean Narayanan at USOE, now the Department of Education, who helped to initiate and shape the National Diffusion Network, and Larry Hutchins who at NIE was largely responsible for the initial design and development of the Research and Development Utilization Program. Without their grand visions of the possible and their persistent efforts to develop and maintain government support for these linking agent programs, we would have little of the now massive evidence of the successful accomplishments of these programs and of the benefits for schools that they provide.

Also deserving mention are the many professionals at the Department of Education and the National Institute of Education who managed the programs and monitored the operational and evaluation projects that provided the data for the studies that are included in this synthesis report. We pay special tribute to the many project directors, project staffs members, linking agents, and local school personnel who also dared to believe in and worked to improve schools through participating in these linking agent programs and projects. Finally, this report is dedicated to the researchers and evaluators who provided the conceptual frameworks, data, interpretations, and analyses on which this synthesis is based. They are identified in the text and in the bibliography of this report.

ABSTRACT

This report summarizes some of the scholarly and empirical research findings of the past two decades concerning a class of rational strategies that emphasize linking schools with outside knowledge and expertise. Special attention is given to an intensive examination and synthesis of findings from five recent or soon-to-be completed studies. The purpose of the report is to consolidate, organize, and interpret the quantitative research evidence concerning the roles, activities, job contexts, and effects of external linking agents and agencies on school improvement outcomes, and to examine the role of the external linking agent in terms of a larger set of internal and external factors that affect these outcomes. Five questions are addressed in this synthesis:
1. What do recent research findings tell us about linking agents?
2. What do linking agent roles look like in actual practice?
3. What is the evidence concerning the effects and outcomes of the efforts of linking agents? 4. What are the implications of recent studies for the selection, training, and support of linking agents, and what are the effective conditions for the employment of linking agents? 5. What implications do these studies have for the initiation, continuation, or modification of efforts employing linking agents to improve schools in the United States in the 1980s?

TABLE OF CONTENTS

DEDICATION....................i.

ABSTRACT....................ii.

LIST OF FIGURES....................v.

LIST OF TABLES....................vi.

PREFACE....................vii.

EXECUTIVE SUMMARY....................ix.

I. INTRODUCTION AND OVERVIEW....................1.1

II. REVIEW OF PREVIOUS THEORETICAL AND EMPIRICAL STUDIES....................2.1

A. Theoretical Conceptions of Linking Agent Roles....................2.1

1. Introduction....................2.1
2. Recent Conceptions in the Field of Education: the Piele analysis....................2.2
3. The "Linking Process in Educational Improvement" Volume....................2.5
4. The Butler and Paisley Analysis....................2.7
5. Comparison of Linking Agent Roles....................2.11
6. Summary....................2.14

B. Empirical Conceptions of Linking Agent Roles....................2.17

1. External Agents and Knowledge Utilization....................2.17
2. School District and School Personnel in Knowledge Utilization....................2.24

III. SYNOPSES OF THE STUDIES....................3.1

Description of the Scope of the Current Synthesis....3.1

A. Building Capacity for Improvement of Educational Practice: An Evaluation of NIE's State Dissemination Grants Program....................3.2

1. Program Description....................3.2
2. Program Assumptions....................3.3
3. Study Methodology....................3.3
4. Key Overall Program Findings....................3.4
5. Key Findings Regarding Linking Agents....................3.5

B. A Study of Dissemination Efforts Supporting School Improvement....................3.14

1. Program Description....................3.14
2. Program Assumptions....................3.15

   - 3. Study Methodology..................................3.16
   - 4. Key Overall Program Findings.......................3.16
   - 5. External Facilitators..............................3.20

- C. Linking R&D With Schools: The Study of the NIE Research and Development Utilization Program.........3.25
   - 1. Program Description................................3.25
   - 2. Program Assumptions................................3.29
   - 3. Study Methodology..................................3.32
   - 4. Key Overall Program Findings.......................3.34

- D. The Research For Better Schools Local School Improvement Study.................................3.48
   - 1. Program Description................................3.48
   - 2. Program Assumptions................................3.48
   - 3. Study Methodology..................................3.49
   - 4. Key Overall Findings...............................3.49

- E. The RBS Study of Regional Service Agencies...........3.52
   - 1. Program Description................................3.52
   - 2. Program Assumptions................................3.53
   - 3. Study Methodology..................................3.54
   - 4. Key Findings.......................................3.54

IV. CROSS-STUDY SYNTHESIS......................................4.1

- A. Gross Similarities and Differences in Linking Agent Roles Across the Projects......................4.1
- B. Selection, Training, and Support for Linking Agents..4.7
- C. Linking Agent Work...................................4.13
   - 1. State Dissemination Grants Program...............4.13
   - 2. The RBS/ESA Study................................4.17
   - 3. The DESSI Study..................................4.21
   - 4. Linking R&D With Schools (RDU) Agents............4.23
   - 5. RBS Local School Improvement Agents..............4.34
   - 6. Summary and Commentary...........................4.35
- D. Linking Agent Effects and Outcomes...................4.45
   - 1. The NTS and RBS Study Findings...................4.45
   - 2. The DESSI and Linking R&D With Schools Outcome Models...................................4.47
   - 3. Other Differences Between the RDU and DESSI Studies..4.51
   - 4. A Comparison of Significant RDU and DESSI Findings...4.52
   - 5. Discussion and Commentary........................4.57

E. Effects of Program, Host Organization, and Clients on Linking Agent Activity....................4.67

V. IMPLICATIONS..5.1

Prospects for Educational Linking Agents and Agencies in an Era of Funding Cutbacks, Program Consolidation, and Federal Retrenchment..................................5.1

BIBLIOGRAPHY FOR STUDIES REVIEWED IN CHAPTER III...............6.1

A. Building Capacity for Improvement of Educational Practice (SDGP)..........................6.1

B. A Study of Dissemination Efforts Supporting School Improvement (DESSI)..........................6.1

C. Linking R&D With Schools (RDU)......................6.2

D. Research For Better Schools Local School Improvement Study (RBS/LSI).........................6.4

E. RBS Study of Regional Service Agencies (RBS/ESA).....6.4

Publications List for A Study of Dissemination Efforts Supporting School Improvement (DESSI)....................6.5

REFERENCES...7.1

LIST OF FIGURES

Figure 1. Comparison of Three Linking Agent Roles According to Agent and Client Characteristics..........................2.4

Figure 2. Three Modal Roles and their Relationship with Selected Linking Functions...............................2.10

Figure 3. Comparison of Linking Agent Roles..........................2.12

Figure 4. A Schema for Examining the Impact of Knowledge Utilization on Local Schools.............................3.35

Figure 5. A Mapping of the NTS (SDGP) Factors on the Butler-Pailey Specialization Triangle.....................4.18

LIST OF TABLES

Table 1. Percent of 4,354 Linkers Cross-Classified by Linker Service Activities and Location of Linker................3.5

Table 2. Linkers Classified by Type...............................3.10

Table 3. External Facilitator Assistance Factors..................3.22

Table 4. Percent of Variance Explained by Three Intervention Strategies and School Characteristics....................3.44

Table 5. Factor Analysis of Eleven Field Agent Roles..............3.56

Table 6. Selected Differences Among Pure-Type Field Agent Roles...3.60

Table 7. Distribution of Field Agents by Activity Type............3.62

Table 8. Location of Linking Agents by Type of Program and Organization...4.3

Table 9. Number and Percent of Linking Agents Distributed by Size of Agent Service Region Within Major School Improvement Strategies..................................4.6

Table 10. Ranks and Mean Ratings of RDU Field Agents' Expected and Actual Extent of Performance of Various RDU Agent Roles..4.25

Table 11. Ranks and Mean Ratings of Perceived Importance and Actual Amount of Time Spent on Various RDU Agent Activities.....4.27

Table 12. Intercorrelations of RDU Agent Roles and Activities......4.29

Table 13. Correlations Between RDU Role and Activity Scales and Other RDU Study Variable.................................4.31

Table 14 Strategies and Associated Linking Agent Work Factors.....4.39

Table 15 Strategies and Associated Linking Agent Work Factors (Tactics) Grouped in Terms of Similarity.................4.40

PREFACE

This synthesis report is addressed to a small and specialized group of policy analysts, researchers and evaluators, program and project directors, dissemination specialists, and others who may be concerned with the design, management, or evaluation of programs and projects employing linking agents to assist local school personnel in school improvement efforts. In this volume we have attempted to pull together in one place a selected body of recent research describing linking agents and the effects they have on schools.

During the past five years, the Educational Dissemination Studies Program has sponsored the preparation of a series of eleven reports dealing with linking agents. This synthesis updates these earlier studies, summarizes two recent reviews provided by Michael Fullan (1981) and Karen Seashore Louis (1981), and then focuses on an intensive examination of five recently completed or soon-to-be completed studies. Each of the selected studies deals with many aspects of programmatic school improvement; however, this synthesis will focus primarily on describing the work of linking agents and how linking agents affect and are affected by the clients and others they work with in school improvement efforts. Initially, the purpose of this study was much narrower, namely, to compare the results of factor analyses of linking agent roles and activities that have been reported as part of the data analyses in four of the studies, and to interpret and relate these factor analysis findings to earlier theoretical and empirical descriptions of linking agent roles. However, as we reviewed the studies, we became increasingly impressed with the wealth of information they provided, not only regarding linking agent activities, but also regarding highly positive outcomes and benefits for school improvement as a result of their work. Consequently, we redefined the purpose of the synthesis as an effort to consolidate, organize, and interpret primarily the quantitative research evidence concerning the roles, activities, job contexts, and effects of agents and agencies working to link external knowledge to school improvement projects.

The quantitative nature of this synthesis should be noted. We warn the reader that this report does not attempt to deal with the very rich store of qualitative data and case studies included in the five studies. Moreover, the quantitative methods and results we chose to highlight and critique in the synthesis were, in some of the studies, simply used as a convenient means to organize qualitative data or to support primarily qualitative findings. In fact, in some instances, the methodology was primarily qualitative. Rather, we have focused primarily on examining, comparing, and critiquing the quantitative findings.

We also note, in fairness to the study researchers, that all the studies represent pioneering research efforts that deliberately attempted to provide much new information on linking agents and school improvement. In most cases appropriate instruments and measures did not exist and there was often a dearth of prior research on which to base the study research designs. Moreover, the five studies are roughly contemporaneous, and were thus not able to draw fully on the findings of each other. This synthesis thus presents an organized body of findings that is vastly larger than was available to the individual investigators at the time they initiated their research. Hence, our critique of specific instruments and approaches is not intended, and should not be read, as a criticism of the way these studies were designed and executed, but rather as an effort to strengthen the quantitative methodology that may be employed in future studies.

Because the literature reviewed in this synthesis encompasses several thousand pages of printed reports, we doubt that many readers will have the time or resources to examine more than part of it. For this reason, we have provided much specific detail, especially with respect to statistical results, in order to save the reader who may be interested in the statistical results some of the time and effort required to obtain and consult the original reports. Moreover, we have made extensive use of footnotes to provide additional information. This choice has made parts of this synthesis, especially Chapters III and IV, long and, in places, quite tedious to read. We encourage the less technically oriented reader to skip over the statistical detail and the footnotes. This will make the reading a little easier, but not much. This is, admittedly, a difficult, fact-packed study that is not intended for casual reading. However, we sincerely hope that those readers with a serious interest in recent research on the role of linking agents in school improvement will find the effort required to read this synthesis worthwhile.

Special recognition is due Ward Mason and John Egermeier at the National Institute for Education for their continuing assistance in the planning, preparation, and review of this synthesis. The following persons have contributed by reading and commenting on earlier drafts: Naida Bagenstos, Pat Cox, John Egermeier, William Firestone, Karen Louis, Doren Madey, Matthew Miles, and Ward Mason. Where possible, we have tried to respond to their many helpful suggestions. Their assistance has helped to improve accuracy of the findings and interpretations which are reported. However, their assistance should not be interpreted as an endorsement. The conclusions and interpretations made in this synthesis are the sole responsibility of the author. Fred Rosenau deserves our special thanks for editing this report. We also want to express special appreciation to Charles Altizer and Doris Smith for their assistance in typing the several drafts of this report and preparing final copy for reproduction.

EXECUTIVE SUMMARY

This report summarizes some of the scholarly and empirical research findings of the past two decades and gives special attention to several recent studies of a class of "rational" strategies that emphasize linking schools with outside knowledge and expertise. Although the linking agent in these studies is sometimes a single person, neither the original scholarly conceptualizations nor the more recent program arrangements are so restricted. The linking "agent" may be a person or persons, or an agency or agencies, acting as intermediaries or "boundary spanners" between educational organizations and more distant sources of knowledge and assistance. In this synthesis we focus on linking agents who provide direct services to local elementary and secondary schools.

Until recently, most of our research information about linking agents was concerned with external agents, i.e., with those persons and agencies located outside the larger client organization. Recent studies have begun to define the role of internal agents, e.g., school district central office staff, and to describe the relations and effects of both types of agents on the achievement of school improvement outcomes. These recent studies provide a wealth of information, including much impressive documentation of positive benefits for school improvement. Moreover, these recent studies tend to reinforce each other in many of their conclusions and offer strong evidence that linking agent strategies can indeed improve schools. In order to make these results and their interpretations more generally available this synthesis was undertaken. The purpose is to consolidate, organize, and interpret quantitative research evidence concerning the roles, activities, job contexts, and effects of external agents on school improvement outcomes, and to examine the role of the external agent in terms of a larger set of internal and external factors that affect these outcomes.

Five generic questions are addressed in this synthesis:

1. What do recent research findings tell us about linking agents?
2. What do liking agent roles look like in actual practice?
3. What is the evidence concerning the effects and outcomes of the efforts of linking agents?
4. What are the implications of recent studies for selection, training and support of linking agents, and what are the favorable conditions for effective employment of linking agents?
5. What implications do these studies have for the initiation, continuation, or modification of efforts employing linking agents to improve schools in the United States in the 1980s?

Chapter I provides an introduction and overview of the synthesis.

Chapter II reviews studies that provide the theoretical and research foundations for the studies described in Chapter III. Theoretical conceptualizations provided by Havelock, Piele, Crandall, and Butler and Paisley are reviewed and compared. The recent reviews of empirical studies of external linking agents (Louis, 1981) and of school district and school personnel in knowledge utilization (Fullan, 1981) are summarized.

Chapter III presents a synopsis of each of five selected studies. These include:

- Building Capacity for Educational Practice: An Evaluation of NIE's State Dissemination Grants Program;
- Study of Dissemination Efforts Supporting School Improvement (a Study of Four Major Federal Programs);
- Linking R&D with Schools: The Study of the NIE Research and Development Utilization Program;
- The Research for Better Schools Local School Improvement Study; and
- The Research for Better Schools Study of Regional Educational Service Agencies.

Each study synopsis is organized into the following topics: 1) a brief description of the dissemination program(s) included in the study; 2) a review of the explicit or implicit assumptions on which the program(s) were based; 3) a description of the study methodology; 4) a description of the key overall program findings; and 5) a description of findings regarding linking agents.

Chapter IV provides a cross-study synthesis. Five topics are examined in depth:

- description and analysis of the gross differences in linking agent roles across projects;
- review of findings concerning the selection, training, and support of individuals performing linking agent roles;
- analysis of linking agent work, with special emphasis given to a comparison of findings regarding roles and activities performed by individual agents;
- comparison and analysis of the study findings regarding the effects and outcomes of linking agent activities, and the relation of these effects to other factors influencing school improvement outcomes and benefits; and
- description and analysis of the effect of program, host organization, and school-site staff on the activities of individual

The findings for each topic are summarized below.

Differences in linking agent roles across projects. Although the programs described in the studies involved several thousand linking agents, detailed data is based on samples of agents totaling 428 persons; 136 associated with the State Dissemination Grants Program (SDGP); 138 associated with the regional educational service agencies included in the RBS study (RBS/ESA); 95 associated with the Dissemination Efforts Supporting School Improvement (DESSI) study; 53 associated with the Research and Development Utilization (RDU) study; and six with the RBS Local School Improvement (RBS/LSI) study. Analysis of the descriptions of agent work suggested that three modal forms of assistance, or dominant linking agent strategies, are represented in the sample of studies, each representing approximately a third of the sample of agents: (1) bibliographic and curricular information utilization (SDGP), (2) legal and programmatic knowledge utilization, including consulting, training, and technical assistance (RBS/ESAs), and (3) rational problem-solving focused on the adoption and implementation of validated products and programs (DESSI, RDU, RBS/LSI). In terms of the scope and intensity of agent work. the programs could be arranged in the order listed above. Typically SDGP agents served many individuals. Although there were exceptions, the agent's task was primarily confined to determining client needs for information, forwarding requests for information searches to specialists, and then sometimes making deliveries and helping clients (usually individuals) to screen, select, interpret, or perhaps even use the information for some specific purpose. Next up the scale of intensity and down the scale of scope are the RBS/ESA agents. These agents exhibited very large differences depending on the predominant roles they played (curriculum expert/trainer, liaison, monitor) and the particular clients they worked with, but their work was often more intense and specialized that that performed by SDGP agents, but yet not as intense and specialized as that of the DESSI, RDU, and RBS/LSI agents. Agents associated with the last three projects all tended to work with a relatively small number of school sites, often worked with a local planning/implementation team rather than individuals, and focused on assisting schools to define major educational needs, search for appropriate, effective programs and products, and then assisted schools in implementing these innovations.

When the linking agents were classified by the dominant school improvement strategy they employed (Information Use Assistance; General Technical Assistance; Problem-Solving/Program Implementation) and by the size of the agents' service region (Local; Intermediate/Regional; State/Multi-State/National) a strong correspondence was found. Most of the information use assistance agents (69%) are found at the local level; while most of the problem-solving/program implementation agents (72%) operate at state, multi-state, or national levels. It is suggested that as agents decrease the number of clients they serve in order to increase the intensity and breadth of sevices they provide to clients, the more likely it is that the agents will be operating in programs that that are state, multi-state, or national in their service orientation.

Viewed in another way, the data suggest that the knowledge and skills required to accomplish the more complex, specialized, and costly types of school improvement assistance may be in relatively short supply and are found only in the organizations of major federal and state dissemination programs, whereas simpler and less costly services may be provided by many education specialists located in intermediate agencies and local school districts throughout the country. If this distribution of agents in the combined sample even roughly approximates the total population of education linking agents, the sobering implication is that the "New Federalism" of the Reagan Administration may bring with it the demise of most of the more complex and ambitious strategies for school improvement that have been predominantly supported by federal funds, thus leaving schools with only less costly and intensive forms of external assistance.

Selection, training, and support for linking agents. Only one of the five studies reviewed provided extensive information on this topic, the Linking R&D with Schools (RDU) study, and particularly Spencer and Louis (1980). However, this source provides an extensive description for RDU agents, including a substantial statistical analysis of relationships between training and support measures and measures of linker attitudes and their expectations and perceptions of their behavior. In addition, these relationships are examined in terms of three intervening variables (age, percent time devoted to linking role, years teaching experience). A relatively limited number of significant relationships were found. The RDU researchers concluded that the types of training and support systems that were employed by the RDU projects were not sufficently robust or intrusive to counter the basic personality and work styles of the agents. It appears from the RDU findings that the predispositions and convictions of individual agents, as well as their previous job experience, may have much greater influence on linker attitudes and behavior than do training and support systems. However, the results do indicate that the support systems were more significant in shaping attitudes and behavior than were the formal training events sponsored by the projects. Further, in another RDU report, Louis and Kell (1981, p. 171) conclude that the RDU data on agents do not support a "science of selection." The only characteristics that emerged as significant were agents' age, teaching experience, and dispositions to be supportive and low-profile rather than "innovative." Teachers and principals were both more satisfied with agents disposed to the former style. Older agents and agents with more teaching experience were more likely to play content specialist roles that reduce conflict and job stress, but were less likely to perform central boundary-spanning activities and generalist-coordinator roles that were more often associated with positive school outcomes. Although significant, the influence of these characteristics is not large. It appears that many different types of persons can perform effectively in these RDU field agent positions.

Linking agent work. All five of the selected studies provide significant data on linking agent work. One remarkable methodological similarity among the studies is the fact that four of the five employed factor analyses of linking agent activity items to derive empirical descriptions of linking agent roles. The factor analysis results and related data are examined, compared, and critiqued in this section of Chapter IV. Twenty factors were identified in the four studies.

To make sense out of the list of 20 factors, an interpretation is presented that suggests there are perhaps six highly generic clusters represented in the results of these studies: (1) a cluster represented by roles and activities which are concerned with general communication, liaison, coordination, and boundary-spanning; (2) a resource finding cluster; (3) a knowlege use facilitator cluster representing skills especially employed to assist individuals in a broad variety of information use contexts; (4) a more specific curriculum expert/trainer skills cluster; (5) a problem-solving/program implementation assistance cluster; and (6) a miscellaneous cluster that includes a broad array of administrative, financial, maintenance, housekeeping, self-development, and other functions that have been largely ignored in the analysis of linking agent work because they are less directly associated with agent-client interaction. Missing from the list is a pure process helper cluster. The reasons for its absence are discussed. The findings are reconciled with the Havelock, Piele, Butler-Paisley theoretical conceptions presented in Chapter II.

Linking agent effects and outcomes. Four of the five studies provide data on this topic. These findings are examined in substantial detail. The RBS/LSI, RDU, and DESSI studies are all remarkable contributions to the empirical literature on at least three counts. First, they provide significant information regarding intermediate or more distal outcomes and benefits in schools as a result of linking agent-initiated efforts to assist school staff to implement improved school practices. Second, all three studies provide data that indicate how external assistance, local assistance (from central office administrators and school principals), and school staff characteristics/ activities interact to account for outcomes. Third, all three studies relied heavily on a combination of quantitative and qualitative data to present, explain, and illuminate their findings. This wealth of data presents an immensely detailed and complex set of images of the interplay of forces that are at work in major school improvement efforts. In order to organize these cross-study findings, data bearing on five themes are examined:

The first theme is that impacts vary, depending on what you look at. Where a broad view was taken of possible outcomes, many significant positive effects and benefits were found. Thus, the lesson to be learned from these studies is that where major change efforts are involved, they ought to be matched by an effort to measure broad impacts that cover a variety of types of possible outcomes.

A second theme is that external assistance can be important, but the size, nature, and even the positive or negative direction of influence depend on many factors (such as where, when, how, by whom, and for whom) is external assistance provided. The RDU and DESSI studies demonstrate that when multiple measures of linking agent assistance are combined with multiple measures of outcomes, complex but meaningful patterns of impact are obtained. Both of these studies indicate that external assistance has substantially greater effects on some school improvement outcomes than on others, that different types of effects and benefits are produced at the individual classroom teacher level and at the school organizational level, and that two types of assistance (generalist-facilitator and specialist-trainer) combine to produce incrementally positive effects for several outcomes.

A third theme is that the nature of the innovation and, more particularly, the demands it places on local staff to undertake major changes are important. In the RDU study, product characteristics alone accounted for substantial portions of variance on some outcome measures. The DESSI study found markedly different models of predictor to outcome measure relationships for individual teacher outcomes when the sample was split into teachers for whom the innovation represented a major or minor change. When this was done, significant but different patterns of predictors were found in both samples. The number of significant predictors and the number of outcomes affected were both substantially larger when a major practice change was involved. Although the RDU data on product characteristics were aggregated to site rather than individual teacher, there is a remarkable correspondence between the RDU product characteristics of complexity and difficulty of implementation, which positively affected outcomes, and the DESSI distinction of minor versus major practice change. Both studies strongly support the adage, "little ventured, little gained." Where much was ventured in attempting to accomplish major practice changes, many different external and local assistance forces came into play in accomplishing individual and organizational changes that produced a wide variety of benefits.

The fourth and fifth themes center on the local assistance forces. The fourth theme is that local help from central office staff or school principals is important. Local assistance was found to be a significant positive influence in all three studies---DESSI, RBS/LSI, and RDU. The fifth and final theme is that the local context, including school and staff characteristics, readiness, and motivation, is extremely important in accounting for outcomes.

In the aggregate, these studies provide impressive evidence that externally initiated and facilitated change efforts can produce positive changes in schools, both in the curriculum and instructional practices of individual teachers and in the organizational relationships and problem-solving structures and processes of schools as organizations. These changes, in turn, lead to many organizational and personal benefits for schools, for staff, and for students. Moreover, although total change costs, including in-kind contributions of site and school district staff time and effort, were modest, large, broad-scale change was often accomplished and these larger efforts were usually associated with large payoffs. If little was ventured, little was gained. A related point is that large amounts of external support (whether in dollars or assistance effort) were not always required and could sometimes even be counterproductive. What seemed to matter is when, where, and how external assistance is provided and toward what aspects of a complex sequence of change events it is directed. These studies show that external facilitator-generalists often make their most potent contributions in getting things started properly and attending to organizational factors that mobilize and sustain local staff interest, committment, help, and participation. These agents also play other potentially important roles in finding and introducing appropriate high-quality products and practices, encouraging broad staff participation, and in helping to identify and arrange for intensive and extensive expert assistance and training at appropriate times. These latter forms of expert assistance were often the most consistently positive, pervasive, and potent sources of external assistance.

However, the effects of external assistance on outcomes were often matched by sources of internal assistance, beginning first with teachers themselves, and often extending to potent, if sometimes subtle, roles played by school principals. The role of central office staff can also be extremely important, but seems contingent on program design and other factors.

Perhaps the key point to all these findings is that external assistance can help schools to improve in very powerful ways by initiating and helping to orchestrate a wide variety of internal and external personnel, material, and knowledge resources so they can be focused, organized, and applied in systematic and sustained efforts to address significant problems. Typically schools and school staff are organized to pursue relatively individual and isolated job roles where attention perforce must be given primarily to "maintenance" and ""coping" with routine daily activities. Consequently, it may well be that the mobilization and continued support of school staff to work, as individuals and as teams, on school improvement efforts that go far beyond those they are able to address individually in the normal context of their daily work, are the *fundamental* keys to the success of the linking agents employing the Problem-Solving/Program Implementation Strategies exemplified in the programs that were examined by the DESSI, RBS/LSI, and RDU studies.

Effects of programs, host organization, and clients on linking agent activity. The final section of Chapter IV examines data indicating how contexts affect linking agents. Perhaps the key finding here is derived from the RDU study which indicates that what agents actually do is primarily a function of the patterns of interpersonal influence in which they are embedded (Louis and Kell, 1981). Two influences appear most critical: the support and influence systems set up by the program and the sponsoring organizations, and the influence of and interactions with key school administrators who act as gate keepers in defining what the agents will be permitted to do in their districts and schools. However, the RDU data especially indicate that agent strategies and approaches to change were primarily the products of their own backgrounds and training. In most cases, they learned to play their linking agent role through trial and error processes. Formal training provided by the sponsoring organizations appeared to have little impact on their role performance, but repeated contacts with significant other (e.g., project and host agency supervisors and school administrators) tended to shape the orientation of their roles.

The final chapter of this report considers the prospects for educational linking agents and agencies in an era of funding cutbacks, program consolidation, and federal retrenchment. The first part of this chapter traces the growth of educational dissemination over the past 25 years. These developments in the field of educational dissemination were played out in the context of much larger social, economic, and political events that influenced their development. Some of the major contextual changes are identified as are some of the more recent trends that have either positive or negative implications for educational dissemination in general or for linking agents in particular. Three trends appear to have negative implications for linking agents in the next several years.

First, there are likely to be markedly fewer categorical or programmatic dissemination and school improvement projects, primarily due to cuts in federal funds and to shortfalls in state and local funds. Second, there may continue to be a slow, but cumulative, erosion of institutional and organizational capacity to produce, disseminate, and use new knowledge to improve schools except in limited, high-priority areas. This capacity will be reduced due to significant federal, state, and local reductions in resources, including money, staff, time, energy, and organizational and professional incentives. Third, there will continue to be marked shifts in educational agency priorities toward emphasis on provision of core services and maintenance of the traditional, long-established, and institutionalized agency functions.

Given these trends, external assistance to schools, whether based on information use assistance, general technical assistance, or more comprehensive problem-solving/program implementation strategies, is most likely to obtain support and be successful only if it addresses some combination of three essential ingredients: it faces and competently helps solve critical educational problems, it is low-cost or cost-saving, and it is low-risk (politically, organizationally, and professionally). Hence, these trends and likely conditions also have positive implications. The needs for school improvement in the sense just described are pervasive. Assistance that addresses these needs successfully will be supported, not as experiments, or demonstrations, or special categorical projects, but as highly valued, if not essential, support services needed to reform, renew, and maintain effective educational operations in a post-industrial, high-technology society. In such a society, school improvement may eventually no longer be viewed as a collection of individual, interesting "ideas" and "innovations" to be episodically and singly adopted, implemented, and then incorporated or discarded, but rather as an intrinsic and continual aspect of the adjustment and renewal functions of a dynamic, adaptive schooling institution. We believe that the primative patterns pointing to the emergence of such an outcome are to be found in the successful school improvement findings reviewed in this final chapter.

In looking back over these trends and implications, we conclude that support for linking agents and agencies is substantially less certain than it was in the 1970s. However, we also conclude that the effectiveness of external assistance provided by linking agents, particularly those providing problem-solving/program implementation assistance has been proven. Educational agencies, at state, intermediate, and local levels will need to decide whether and how they might work together to build and maintain external assistance networks. If these networks can face and respond effectively to the critical needs of schools in the 1980s, there will continue to be an important role for linking agents to serve in school improvement efforts.

I. INTRODUCTION AND OVERVIEW

Many types of persons and agencies are concerned with the maintenance and improvement of educational practices, and many types of approaches are employed to provide direction, guidance, or assistance to schools so as to enable them to maintain high educational standards while adapting to changing educational and social conditions. This report summarizes some of the scholarly and research findings of the past two decades and gives special attention to several recent studies of a class of "rational" strategies that emphasize linking schools with outside sources of knowledge and expertise.

Although the various linking agent programs and projects that were studied differed in many details, they tended to emphasize some, and sometimes all, of the following characteristics:

1. They emphasized highly interpersonal forms of communication to link school personnel with external sources of knowledge and expertise;
2. They emphasized bringing to the attention of educators new educational practices, especially those resulting from systematic research and development or practitioner-developed and validated demonstrations. Then they assisted educators in selecting and implementing new practices appropriate to specific local needs;
3. They provided educators with technical assistance in identifying needs, defining problems, searching for and selecting appropriate solutions, and in planning for, implementing, and evaluating selected solutions;
4. As part of this process, they provided educators with new competencies, not only for using the new practices, but also for improving the problem-solving practices of their schools; and
5. They provided feedback from educators to information resource specialists, trainers, R&D staff, agency and project administrators, and policy makers.

The performance of these several roles provide the operational definition of linking agentry. Although those roles are sometimes viewed as played by a single person in a complementary fashion, neither the original scholarly conceptualizations nor the more recent program configurations are so restricted. The linking "agent" may be a person or persons, or an agency or agencies, acting as intermediaries or "boundary-spanners" between operating schools and more distant sources of knowledge and assistance.

Two more distinctions should be made. First, we should note that linking agents represent a subset of a larger class of "change agents," who have the common feature of attempting to stimulate, influence, promote, induce, guide, facilitate, or coerce change in schools. The hallmark of linking agentry is emphasis on the use of rational strategies and external knowledge sources to foster improved knowledge utilization among organizations and individuals. Second, we note that distinctions are sometimes made between external and internal agents, with external agents defined as those persons or organizations performing linking agent roles located outside the larger client organization (usually a local school district) and internal agents defined as those persons or suborganizations performing linking agent roles inside the larger client organization. Until recently, most of our empirical information about linking agents was concerned with external agents. Recent studies have begun to define not only the role of internal agents, but the relations and effects of both types of agents on the achievement of school improvement outcomes.

These recent studies provide a wealth of information, including much impressive documentation of positive benefits for school improvement. Moreover, these recent studies tend to reinforce each other in many of their major conclusions and offer strong evidence that linking agent strategies can indeed improve schools. In order to make these results and their interpretations more generally available, this synthesis was undertaken. The purpose is to consolidate, organize, and interpret empirical evidence concerning the roles, activities, and effects of agents and agencies working to link external knowledge to school improvement projects.

Over the past five years, the Educational Dissemination Studies Program has sponsored the preparation of a series of reports dealing with linking agents (Blackwell, Hood & Pool, 1978; Butler & Paisley, 1978; Cates, 1978; Emrick & Peterson, 1978; Hood & Cates, 1978; Pool & Hood, 1978; Paisley, Blackwell, Emrick, Rittenhouse & Cooper, 1978; Cates & Ward, 1979; Hood & Blackwell, 1980; Fullan, 1981; Louis, 1981). The reviews by Emrick and Peterson (1978), Fullan (1981), and Louis (1981), in particular, were based on reviews of empirical studies. This synthesis updates these earlier reviews, summarizes the recent reviews provided by Fullan (1981) and by Louis (1981), and then focuses on an intensive examination of five recently completed or soon-to-be-completed studies of major programs involving linking agencies and agents:

- Building Capacity for Educational Practice: An Evaluation of NIE's State Dissemination Grants Program;
- Study of Dissemination Efforts Supporting School Improvement (a Study of Four Major Federal Programs);
- Linking R&D with Schools: The Study of the NIE Research and Development Utilization Program;
- The Research for Better Schools Local School Improvement Study; and
- The Research for Better Schools Study of Regional Educational Service Agencies.

Each of these studies deals with many aspects of programmatic school improvement; however, this synthesis of these studies will focus on the role of linking agents. The generic questions to be considered are:

1. What do these recent research findings tell us about linking agents?
2. What do these linking agent roles look like in actual practice?
3. What is the evidence concerning the effects and outcomes of the efforts of linking agents?
4. What are the implications of recent studies for training and support of linking agents, and what are the favorable conditions for the effective employment of linking agents?
5. What implication do these studies have for the initiation, continuation, or modification of efforts employing linking agents to improve schools in the United States in the 1980s?

Chapter II reviews theoretical and empirical studies. Discussed in the first part of that chapter are several conceptual contributions and analyses, including those provided by Havelock, Piele, Crandall, and Butler and Paisley. Because these conceptualizations sometimes powerfully influenced the design of operational linking systems, the specification of job roles, and the study of linking agent activities and outcomes, they provide the reader with an overview of the conceptual frameworks that have been employed in examining linking agent functions. However, until recently, most of these conceptualizations of linking agents have been prescriptive and logical rather than descriptive and empirical. To provide readers with an overview of empirical findings, the second section of Chapter II summarizes the recent reviews by Karen Louis (1981) and Michael Fullan (1981). Louis reviewed the research literature on the role of external agents and Fullan reviewed the role of school district and school building personnel in knowledge utilization. The purpose of both these reviews was to explore ways in which external and internal linking agents affect local school improvement and knowledge utilization. Both reviewers not only synthesize what is known on the basis of empirical research, but also point out gaps and deficiencies in current understanding of these roles. Chapter II thus provides theoretical and empirical foundations for the examination of the studies described in Chapter III.

Chapter III presents a synopsis of each of the five selected studies. To facilitate comparison, each synopsis is organized into the following topics:

- a brief description of the dissemination program(s) included in the study;
- review of the explicit or implicit assumptions on which the program(s) were based;

- description of the key overall program findings; and
- description of key findings regarding individual linking agents.

Chapter IV provides a cross-study synthesis. Five topics are examined:

- description and analysis of the gross differences in linking agent roles across projects;
- review of findings concerning the selection, training and support of individuals performing linking agent roles;
- analysis of linking agent work, with special emphasis given to a comparison of findings regarding roles and activities performed by individual agents;
- comparison and analysis of the study findings regarding the effects and outcomes of linking agents, and the relation of these effects to other factors influencing school improvement outcomes and benefits; and
- description and analysis of the effect of program, host organization, and school-site staff on the activities of individual agents.

The final chapter of this report considers the prospects for educational linking agents in an era of funding cutbacks, program consolidation, and federal retrenchment in education.

II. REVIEW OF PREVIOUS THEORETICAL AND EMPIRICAL STUDIES

A. Theoretical Conceptions of Linking Agent Roles*

1. Introduction

The general literature on change and innovation has been reviewed by Rogers and Shoemaker (1971). More recently, Glaser and others (1976) have provided a comprehensive distillation. In the field of education, Havelock (1969) produced a definitive synthesis, which has been augmented by several specialized reviews and analyses (e.g., Eidell and Kitchel, 1968, in educational administration; Short, 1973, in curriculum; Gross, Giacquinta, and Bernstein, 1971, in implementation of organizational innovations; Zaltman, Florio, and Sikorski, 1977, in planning and management of educational change efforts; Emrick and Peterson, 1978, on five major studies of federally sponsored educational dissemination and change; Nash and Culbertson, 1977, on current conceptions of the linking processes in educational improvement, and Lehming and Kane, 1981, on knowledge use in schools). This diffusion/change literature offers ample evidence that new ideas and practices are spread most efficiently and used with greatest effect when their dissemination and utilization is facilitated by a person, or a team of persons, functioning as a linking agent who conveys knowledge from more distant sources to ultimate users and assists users in applying that knowledge in their work. However, as we have noted elsewhere (Hood and Cates, 1978), anyone who facilitates the transfer of educational knowledge could be considered a linking agent, but such a simplification leads to a rather unacceptable conceptual situation since virtually anyone in the field of education may be involved in the transfer of knowledge to someone else. Typically the concepts of "linkage" and "linking agent" have been much more restricted.

Lippitt (1965) appears to be the first author to have suggested the term "linking agent"; however, various related concepts such as "social engineer" (Watson, 1945) appear in earlier literature. Glaser and Wrenn (1966) envisioned a change aid team that might go to any city or institution to help in implementing systems changes. Lazarsfeld and others (1967) addressed the need for collaboration between sociologists and clients, and envisioned a new profession of persons who would be able to understand the social scientists and yet be well acquainted with practical client problems. Use of a consultant in this middle-person role was proposed by Lippitt and Havelock (1968) and Havelock (1968). The functions of this middle-person or linker role were elaborated by Havelock (1969) in the following typology of knowledge linking roles and functions:

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*This section is based in part on Hood and Cates (1978).

Role	Functions
Conveyor	- transfers knowledge from producers (scientists, experts, scholars, developers, researchers, and manufacturers) to users.
Consultant	- assists users in identification of problems and resources, provides linkage to appropriate resources, assists in adaptation, serves as a process facilitator.
Trainer	- instills in the user an understanding of an entire area of knowledge or practice.
Leader	- effects linkage through power or influence in one's own group.
Innovator	- (includes originator and also the first user in a social system to adopt an innovation) initiates diffusion in the user system.
Defender	- sensitizes users to the pitfalls of innovations, mobilizes public opinion, public sensitivity, and public demand for adequate applications.

Besides these generic roles, Havelock identified individuals associated with knowledge production, dissemination, and utilization subsystems who play different linkage roles.

Although much of the literature focuses on individual roles or teams of persons, Havelock and others have identified linking agencies and linking systems. Perhaps the most frequently cited example of a complex linking system has been the publicized achievements of the U.S. Department of Agriculture's Cooperative Extension Service (CES). The CES provides information and information-based services to agricultural clients on the complete spectrum of on-the-farm needs. The cornerstone of this system is knowledge, much of it based on sound research and development or on experimental farm-tested and proven practices. But this knowledge is augmented by a variety of print and other media designed for specific agricultural users, preservice and inservice education of agricultural personnel, state demonstration projects, and technical assistance services. Extension specialists provide the human linkage with various specialized disciplinary or problem-oriented knowledge bases, and county agents provide linkage with local agricultural clients. Thus the CES offers a complex example of (a) linking agents, (b) linking agencies, and (c) an integrated linking system. CES examples have strongly influenced the conceptualization of educational linkage.

2. Recent Concepts in Education: the Piele Analysis

Piele (1975) attempted a broad review and analysis of the role, activities, and training of educational linking agents, based on accessible literature published in the previous five years. Piele noted that writers have proposed various models of the change process and in some cases have tried to show that the particular linking agent role in their models would lead to more effective dissemination and utilization. "But few descriptive and comparative studies appear to have been conducted to determine which of these roles is most effective, and fewer still have reached meaningful conclusions" (p. ii).

In this analysis Piele examined several different models and their implications for linking agent roles. He noted that innovation-specific models (e.g., R&D, Innovation Diffusion) are geared toward diffusion and adoption of specific innovations and assume that most problem-solving work has been done before adoption takes place and that many problems of adaptation/maintenance have already been anticipated and solved. By contrast, the Problem-Solving Models (and their variants, e.g., Intervention Strategies, Planned Change, Action Research) tend to be oriented primarily to the _process_ of innovation adoption or problem solution _within_ the client system. Piele concludes that different loci of problem-solving expertise imply further that there will be fundamentally different modes of interaction between agent and client, ranging primarily from _directive_ (adoption of a specific innovation) to _collaborative_ (adaptation and client development of innovation process skills) to _nondirective_ (problem-solving _per se_).

From these distinctions Piele infers three principal types of linking agent roles and, borrowing from Havelock's role terminology, labels these: resource linker, process helper, and solution giver. Piele notes that differences among these roles are too substantive to be simply results of emphasizing different aspects of the change process. Rather, they describe several different change processes that cover a whole range from adoption of R&D products (solution giver) through adaptation of externally developed knowledge skills and innovations (resource linker) to user-initiated problem-solving (process helper). After brief descriptions of each role, Piele compares their advantages and disadvantages (pp. 28-30):

> The resource linker role is characterized by a low level of interpersonal interaction, a high level of client initiative and responsibility, a low level of involvement with each intervention, and a high level of distribution throughout the system . . . Training for this role can be relatively brief, straightforward, and apparently inexpensive . . .
>
> The role of process helper demands a high level of interpersonal interaction, some client initiative and competence in adopting the innovation, and an intermediate level of agent training . . .
>
> An effective solution giver is highly interpersonal, with low client initiative and a correspondingly high agent responsibility for overseeing the adoption and institutionalization of the innovation. Training for such agents will be expensive and only partially transferable . . .
>
> In short, the nondirective agent role is obviously limited, the collaborative process generalist will have difficulty helping with the installation of complex and sophisticated

innovations, and the directive solution giver is expensive and difficult to train. In general, the more extensive the agent's coverage, the less intensive his or her involvement, and the more costly and time consuming is the preparation.

Figure 1 summarizes Piele's comparisons. But it also suggests what may be perhaps the most practical organizing notion we have yet encountered for sorting out different linking agent roles and fuctions; namely, how much time and effort can be spent per client? The resource linker role costs little in terms of agent skills and training and is low in cost per client. These economies are achieved by avoiding substantial involvement with individual clients and/or individual interventions. For success to be achieved, this role must be *matched* to high initiative and high client capability to use delivered resources. Obviously the closer the delivered resources match user readiness, understanding, and capability, the more probable the success of this role. By contrast, the solution-giver role is high in *cost* in terms of time (hence cost) required per client. These skill requirements and per-client time costs result from the high degree of interpersonal interaction and high degree of agent involvement in specific innovations. In effect, this role attempts to compensate for what may be low client initiative or capability.

Figure 1

COMPARISON OF THREE LINKING AGENT ROLES
ACCORDING TO AGENT AND CLIENT CHARACTERISTICS

ROLE CHARACTERISTICS	Resource Linker	Process Helper	Solution Giver
Extent of Agent Skills/ Training Required	**Low**	**Medium**	**High**
Interpersonal Interaction	**Low**	**Medium**	**High**
Agent Involvement with Intervention	**Low**	**Medium**	**High**
Agent Distribution Throughout System	**High**	**Medium**	**Low**
Client Initiative	**High**	**Medium**	**Low**

*** Modified from Piele (1975, p. 30).**

If many clients must be served by a few agents, and especially if these agents are relatively unskilled, then the resource linker role may of necessity be the one played most frequently, simply because it is the least expensive. Process helping can be successful only if (a) the agent possesses the required skills and (b) the agent has enough time to spend with some, perhaps far from all, clients. The solution giver role is feasible only when agent skills are extensive and ample time can be spent with individual clients. Hence the practically employable roles depend greatly on the breadth (and appropriateness) of the agent's repertoire of skills, but perhaps more directly on the number and accessibility of clients the agent is required to serve. Broadly skilled agents may perform all three roles, but may need to reserve their solution giver role for a select portion of their clientele.

Piele's review of the literature and resulting discussions identified a number of problems (Nash and Culbertson, 1977, foreword, p. viii):

1. Functions of linking agents do not typically relate to important system variables that influence change and improvement in schools.

2. Little research exists on linking agent functions.

3. Little attention is paid to the nature and quality of information to be conveyed to practitioners.

4. Linking tends to be equated with change and with adoption of innovations rather than with support for program improvement efforts.

5. The school administrator's role in the linking process is often ignored.

6. Functions of information provision, technical assistance provision, and helping the school system build its capability to assess and improve education are usually seen as separate and integrated roles.

3. The "Linking Process in Educational Improvement" Volume

Subsequently, the National Institute of Education (NIE) commissioned a group of concept papers that addressed several of the issues mentioned above. These were published by the University Council for Educational Administration (UCEA) as Linking Processes in Educational Improvement, 1977. This volume addressed three objectives:

1. To provide for educational leaders an up-to-date synthesis on the role of linking agents and agencies in educational improvement activities and to identify and discuss important knowledge utilization issues of interest to the research, development, and training communities;

2. To address the immediate realities that internal and external linkers confront and to shed light on the kinds of organizational, human, and knowledge resources available to them;

3. To provide better bases for advancing linkage through new plans and developments.

Although special attention was focused on improving the training of linkers, the overall goal was to present concepts that "will advance new developments and plans and will stimulate new inquiry into linking agents, linking agencies, and their functions . . . in order to illuminate the complex processes of linking and their role in facilitating change." In addressing these objectives, each author focused on a different aspect of the linking process and different aspects of the problems identified by Piele.

Douglas Paul (1977) considered change in the context of educational organizations and discussed Havelock's four models of change that can influence and/or be used by linking agents. Jack Culbertson (1977a) presented the broad perspective of the larger environment of knowledge resources and uses that are pertinent to change and postulated five uses of knowledge that can support those engaged in change or providing support for change.

James Lipham (1977) examined the role of the administrator in implementing educational improvement and the leadership functions required in that role. Ann Lieberman (1977) discussed linking agencies and the functions these agencies perform in the context of the school as a social system.

Issues directly related to the external linking agent were addressed by David Crandall (1977). In examining the "universe of the linking agent," he described three major perspectives on the current practice of linking agentry, the resource system on which the agent can draw, the client system served by the agent, and the "host agency," where external linkers reside. In addition, he considered the multiple roles and functions performed by linking agents, attributes and skills associated with the roles, and the issue of selection versus training.

Crandall distinguished between the front-end (predecision) and back-end (postdecision) phases of the innovation adoption process and identified five linking agent roles and functions associated with each. The roles and functions associated with front-end activities are:

Role	Functions
Product peddler	- promote sale or adoption of particular product.
Information linker	- clarify information needs; search for and provide data and information.
Program facilitator	- provide client with variety of curricular and instructional approaches.

Process enabler	- assist client with client problem identification and development of appropriate action.
Provacateur/doer	- devise and initiate alternative futures for education.

Five complementary back-end roles are associated with the postdecision phase of implementation/institutionalization in the innovation process. These are:

Role	Functions
Resource arranger	- assure availability of and access to resources.
Information linker	- clarify information and resource needs.
Technical assister	- get kinks out of a particular program; assist with general problem-solving.
Action researcher/ data feedbacker	- help schools learn how current experience can be applied to future problems.
Educator/capacity builder	- help establish capacity to cope with future problems.

In conclusion, Culbertson (1977b) depicted a future scenario of a nationwide training system for linkers; he also described pertinent support functions, concepts, and events that shape the scenario itself.

4. The Butler and Paisley Analysis

In an effort to build upon the concepts presented in the UCEA volume, the Far West Laboratory commissioned Butler and Paisley (1978) to examine relationships among linking functions and the linking agent role in the context of factors that determine the functions that affect the role. They described the historical context in which educational dissemination has evolved and examined three major clusters of dissemination concepts identified and analyzed since 1966: diffusion of new ideas and practices, structure and function of dissemination programs, and multiple contexts in which dissemination occurs.

They noted that an analysis of past and present experience in dissemination programs employing linking agents indicates that roles and functions of linking agents are differentiated along two dimensions. One involves the internal versus external organizational locus of linkage activity. The other involves the linking agent's "entitlement" to act on behalf of the organization in different ways. The concept of "entitlement" accounts for marked differences in the approach of linking agents to clients and the nature of the ensuing exchange.

External and internal linking agents have in common a "boundary spanning" function. Both bring into an organization, or into a unit within an organization, knowledge and skills that the unit needs but lacks relative to a problem or task. External linking agents have typically represented themselves to clients as available external resources whose lack of specific knowledge of the client organization could be compensated for by the agent's commitment of time and resources to the client's problems. By contrast, the internal agent is likely to be knowledgeable about the organization, but may be less likely to "move heaven and earth" on behalf of clients. Butler and Paisley note that an organization's capacity for self-directed change is symbolized by its staff of internal linking agents, "whether their titles emphasize planning, problem solving, fact finding, or other functions." In many cases, large school districts already have staffs of specialists for self-directed change, so there is little that an "all-purpose" external linking agent can offer a large school district. Butler and Paisley also prophetically note that the ratio of external to internal linkage may decline over time as more school districts gain capability to perform linking functions internally.*

Because the concept of entitlement is somewhat novel, we quote at length from Butler and Paisley:

> The second dimension that differentiates the roles and functions of linking agents involves the linking agent's "entitlement" to act on behalf of the client organization in different ways. Three modal linking roles result from three "entitlements" as follows:
>
> 1. Resource Finder. At the lowest level of entitlement, a linking agent serves as intermediary between the client organization and knowledge resources. The linking agent may conduct information searches or make interpersonal contacts to find answers to clients' questions. The linking agent "negotiates" clients' questions to make them answerable, but does not undertake an analysis of the client organization to determine if the right questions are being asked. Information is turned over to clients in the form of bibliographies, documents, briefing memos, etc. Only infrequently is the resource finder called upon to make presentations to clients, and the structuring of information into a set of recommendations usually goes beyond the entitlement of this role.
>
> 2. Process Helper. Given some degree of entitlement to become involved with the actual problems of the client organization, the linking agent becomes a process helper.

---

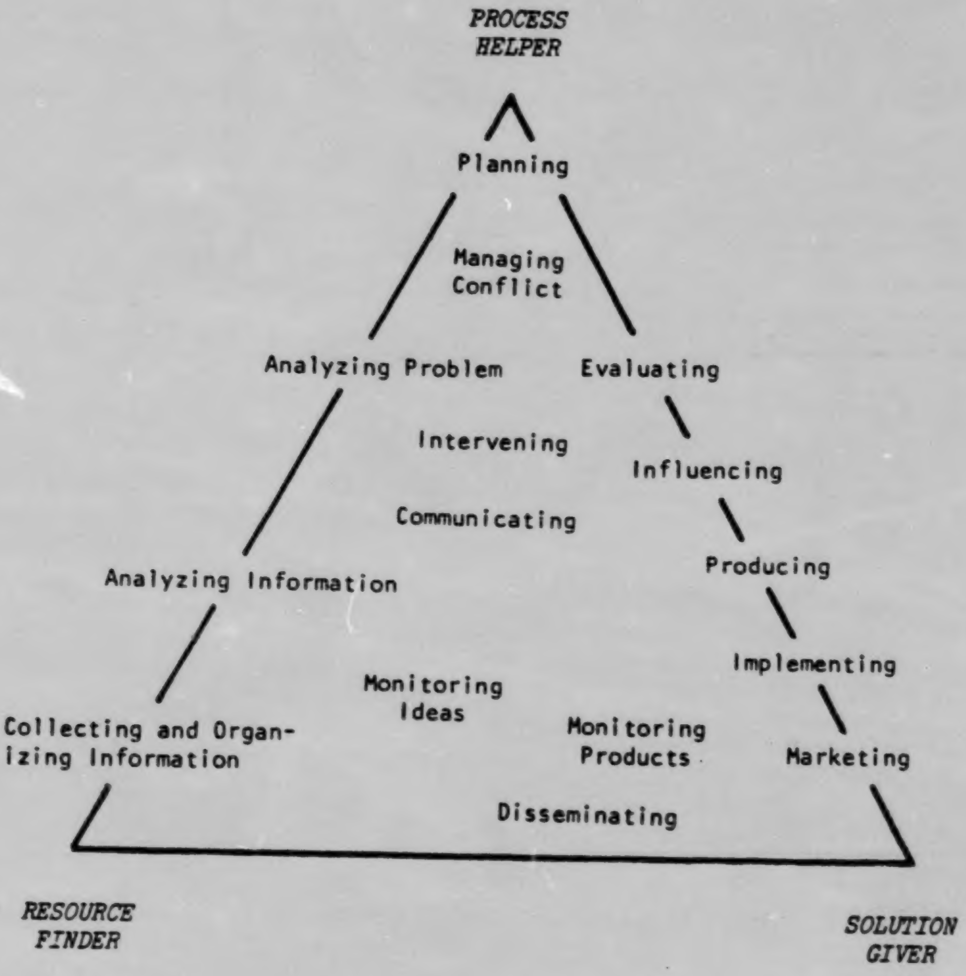
*Assisting schools to acquire and institutionalize knowledge use and problem solving skills were explicit objectives of some of the projects to be reviewed in Chapter III.

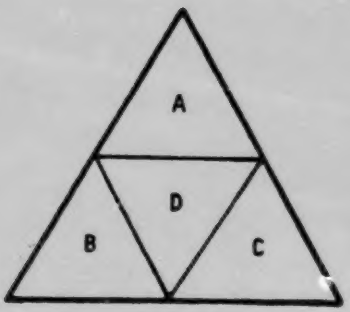
> The process in question may be technical (facilitating problem and analysis and decision making), interpersonal (facilitating group interaction and managing conflict), or both. The process helper may be a proponent of a particular approach to problem analysis, group dynamics, etc., but is neutral with respect to the substantive problem or decision.
>
> 3. Solution Giver. Given entitlement to represent one solution or set of solutions to the client organization's problems, the linking agent becomes a solution giver. The auspices under which the solution giver works with a client organization are more important than the auspices of resource finding or process helping. The solution giver is often affiliated with an R&D organization or other product developer whose reputation becomes part of the solution giver's entitlement. Some linking agents in this role act as brokers for extensive sets of solutions, such as those catalogued in Educational Programs That Work.
>
> The general terms in which these three roles are described derive from Piele (1975). The concept of "entitlement" is our own effort to account for marked differences in the approach of linking agents to clients and the nature of the ensuing exchange. At a simple level of analysis, the linking agent and client form a communication dyad. Each brings to the exchange a frame of reference (cognitive structure), a set of assumptions concerning the purposes of the exchange, an agenda of goals, and expectations concerning the role that the other will play. Expectations concerning the other's role are one aspect of "entitlement," as is the concept of "legitimation" from the sociology of roles.
>
> However, entitlement to play a particular linking role is more than an ascription from the client of the moment. Entitlement travels from one client to another with the linking agent, and one of the initial tasks of the linking agent in contacting a new client is to clarify--and justify if necessary--the entitlement under which certain linking functions are to be performed. Linking functions themselves are only partly indicative of the particular role; there is functional overlap among the roles. The auspices of the linking agent's work are an even poorer indicator of the role, since employees of the same organization may act as resource finders, process helpers, and solution givers. (Butler and Paisley, 1978, pp. 30-31)

To illustrate the overlap among roles, Butler and Paisley depicted (see Figure 2) the three modal roles represented as apexes of the same triangle of linking functions. They noted that, theoretically, a linking agent may perform any combination of functions shown in the triangle, but because juxtaposed functions call for related skills, it is more likely that an

Figure 2

THREE MODAL LINKING ROLES AND THEIR RELATIONSHIP WITH SELECTED LINKING FUNCTIONS


PROCESS HELPER
Planning
Managing Conflict
Analyzing Problem
Evaluating
Intervening
Influencing
Communicating
Analyzing Information
Producing
Implementing
Monitoring Ideas
Collecting and Organizing Information
Monitoring Products
Marketing
Disseminating
RESOURCE FINDER
SOLUTION GIVER



SPECIALIZATIONS:

A *and* B *and* C *and* D = "superlinker"

A *or* B *or* C = linking agent optimally prepared for one mode of client contact. unprepared for other modes of contact

D = generalist linking agent, "scout"

agent will perform a set of functions in one region of the triangle only. At the bottom of Figure 2, they divide the triangle into four regions that correspond to the three modal roles, as well as to a "generalist/scout" role that primarily involves communication functions alone. The possibility that a linker may seek to play all four roles creates the possibility of a fifth, "superlinker" role.

The triangular depiction in Figure 2 introduces a new way of thinking about roles and their relations to functions. In this conceptualization, the linker roles, as described by Havelock and elaborated by Piele, are not seen as functionally well-defined and mutually exclusive categories. Rather they can be seen as less well-defined areas of functional specialization. Linking agents may perform any or all of the functions mapped. Also, further specialization, perhaps involving performance of one or two functions, is possible. Conversely, linking agents may perform functions in more than one area of specialization. And, at least in theory, a "superlinker" could play all specialized roles.

5. Comparison of Linking Agent Roles

On first examination, the roles described by Crandall seem to be considerably removed from those described by Havelock, Piele, and Butler and Paisley. However, some reconciliation is possible. Crandall's distinction of "front-end" (predecision to adopt or change) and "back-end" (post-decision) is an heuristic device. The two sets of roles are seen by Crandall as mirror images of similar styles of linking agent behavior. Are these five roles relatable to the Butler and Paisley schema? (See Figure 3.) Crandall's product peddler, resource arranger, and information linker roles are all variants of "resource finder." His program facilitator/technical assister roles are somewhere in the "solution giver" area. His process enabler and action researcher/data feedbacker roles are obviously versions of the "process helper" modal role. However, the provocateur/doer and educateur/capacity builder roles are not easily placed because of their strong anti-status quo character, but they seem closest to the "superlinker" in their role requirements. In Figure 3 we display a comparison of these several versions of linking agent roles. Descriptions from which these conceptions are drawn are more concerned with the agent's idealized style of operation or mode of contact with the client than with the actual functions and activities performed. Hence the term "modal roles" used by Butler and Paisley (or "archetypical" roles used by Crandall) can be applied to the roles and functions of Havelock and Crandall as well.

Linker contexts. Unfortunately, in the theoretical literature we find that discussions of these roles and functions are rarely associated with a specific context in which they are performed. The discussions give little if any indication of the factors that influence or change the character, cost effectiveness, support needs, and other aspects of linking agent performance. They tell us little or nothing about characteristics of the client organization, goals of the dissemination agency, amount of time a field agent can spend with a client, etc. In essence, such descriptions and definitions are global in their nature.

FIGURE 3

COMPARISON OF LINKING AGENT ROLES

HAVELOCK (In Eidell & Kitchell, 1968, 1969)	HAVELOCK (1973)	PIELE (1975)	BUTLER-PAISLEY (1978)	CRANDALL (1977)	
				Front-End Roles	Back-End Roles
Conveyor	Resource Linker	Resource Finder	Resource Finder	Product Peddler Information Linker	Resource Arranger Information Linker
Consultant Leader	Process Helper	Process Helper	Process Helper	Process Enabler	Action Researcher/ Data Feedbacker
Trainer Innovator	Solution Giver	Solution Giver	Solution Giver	Program Facilitator	Technical Assister
	Catalyst		Generalist/ Scout		
	"Whole Role"		"Superlinker"	Provocateur	Educateur/ Capacity Builder

Similarly, discussions pointing to the influence of contexts on various roles and functions also can be said to emphasize global and generic contexts rather than specific contextual factors that affect particular roles and functions or those system variables that influence change and improvement in schools. For example, Butler and Paisley remind us of the multiple contexts in which educational dissemination occurs: historical, political, economic, social, psychological, cultural, etc. They point out that such "contexts" are circumstances that differentiate settings in which educators work and in which dissemination takes place, and emphasize the far-reaching effects of context upon dissemination. In particular, they state that "ultimately it is the context of a program that determines its structure and function, its scope and duration, and its acceptance and utilization by clients."

Crandall gave special attention to the "universe of the linking agent" in terms of the three contexts in which the linker is most directly involved: the resource system, the client system, and the linker's host agency. In describing the resource system, he reviewed the types of resources available to the linking agent, the sources of products and programs for the linking agents, and the attributes of innovations as they are perceived by the potential user. He concluded with this emphasis (p. 204):

> . . . it should be obvious that a prime requirement for linking agents is not only greater understanding of the tangible resources which they will be called upon to bring to clients or themselves but also increased skills in comprehending and coping with the motivations, operating assumptions and preferred styles of interaction of those in the resource system. The linking agent's task as the intermediary playing a translation role relative to potential resources is vastly complicated by the multiple-innovation phenomenon. The factors noted above are but one part of the universe with which linking agents will interact, and these factors are in dynamic tension with the features of the client system itself...

The focus of his discussion of the client system serves to illustrate the complexity of the school culture and to stress the need for linking agents to understand the many facets of the client systems with which they work. He stresses that knowledge of organizational dynamics is essential to effective management of planned change.

Crandall also considered agencies or organizations in which external linking agents will be housed as one of the influences on effective dissemination efforts. Most host agencies think of their function more in terms of their relationship with clients than in terms of their relationships with and expectations for the linking agents themselves. Responsibility for providing an adequate support system for linkers must fall to the host agency (p. 213):

> Linking agents will invariably face ongoing problems of marginality (role-role distance) with both their clients and their colleagues. They may suffer from a sizable gap between their various professional roles and their concept

> of self. It is the host agency's responsibility to build in support mechanisms which lead to increasing role linkage, defined as a relatively small perceived gap between one's own role and that of others and of self.

Although discussions such as Butler and Paisley's and Crandall's accurately point to critical contextual factors, they can point only to what ought to be considered. They do not provide the more specific information necessary for effective planning, training, and linking.

Most analyses proceed directly from discussion of roles to discussions of prerequisite personal attributes or requisite competencies (knowledge, skills, sensitivities) for those roles.

In virtually every case, the derivations are primarily logical deductions, though often based on general observations and sometimes on personal experience in the role. However, virtually all the derivations are technically incomplete and few, if any, are grounded in systematic observations of the job performance or in empirical task analysis.

6. Summary

The concept of the linking agent is recent (Lippitt, 1965). Although action research, group dynamics, and planned change are ideas that have been discussed for several decades, the active interest in linkage (as a form of dissemination) between educational R&D and educational practitioners can be traced specifically to Havelock (1968-69). The Pilot State Dissemination Program (1970-1973) possibly represents the first intentional national effort to place full-time educational linking agents in the field (serving school personnel in Oregon, South Carolina, and Utah). Aside from a few isolated case studies, the Sieber et al. (1974) "Evaluation of the Pilot State Dissemination Program" represents perhaps the first systematic empirical analysis of roles and positions (three project directors, 12 information specialists, and seven field agents). Other empirical studies by Emrick et al. (1977) of the National Diffusion Network, by the Center for New Schools (Moore et al., 1977) of Technical Assistance Groups, and by Blackwell et al. (1978) of the Research and Development Utilization Program are all so recent that their implications for linking agentry are still being examined (see Emrick and Peterson, 1978, for one recent synthesis; see the next section of this chapter for recent reviews by Louis, 1981, and Fullan, 1981). In the absence of substantial accessible data, most conceptions of educational linking agents have been prescriptive and logical rather than descriptive and empirical. Havelock's image of three modal roles (resource linker, process helper, and solution giver) has exerted a substantial influence on subsequent thinking, first through Piele's review and analysis and then more recently through the Butler and Paisley exposition of linking agent "entitlements" and their conception of areas of specialization. Crandall's conceptualization has pushed these synthetic idealizations slightly more toward reality by identifying and describing a variety of roles that he believes can be found among recent educational dissemination efforts. As demonstrated, Crandall's roles can be mapped onto the Butler and Paisley role speciality "triangle." Hence, at an analytic level, there appears to be no contradiction. However, nearly all our knowledge is based on idealized conceptual frameworks and derivations that are very tenuously grounded in observational data. Systematic inquiry into the real world and work of various kinds of educational linking agents has barely begun and is acutely needed in order to verify or correct the derivations of job and task descriptions, personnel requirements, training objectives, etc., which are now based primarily on ungrounded theorizing and conjecture. It is toward this end that we contribute this synthesis of recent empirical literature. In the next section we summarize two recent reviews of empirical literature.

B. Empirical Conceptions of Linking Agent's Roles

Karen Louis (1981) and Michael Fullan (1981) reviewed, respectively, the roles of external agents and the roles of school district and building personnel (internal agents) in knowledge utilization. The purpose of both these reviews was to explore the ways in which external or internal linking agents affect local school improvement and knowledge utilization. Both authors attempted not only to synthesize what is known, but also to point out gaps and deficiencies in current understanding of these roles.

1. External Agents and Knowledge Utilization

Drawing on recent research (e.g., Sieber et al., 1972; Corwin, 1972; Berman and McLaughlin, 1974, 1975, 1977; Runkel and Bell, 1976; Emrick et al., 1977; Miles, Fullan, et al., 1978; Moore et al., 1977; Louis and Seiber, 1979; Louis, Rosenblum, et al., 1981), Louis specifically addressed the question of the impact of external agents on schools and individual educators. However, before doing so, Louis (1981) examined the various definitions and conceptions of external agents and then proposed her own broader definition:

> An external agent is an individual, group, or organization located outside the boundaries of the client system, whose objective is to assist client(s)--individuals, groups, individual educators, groups of educators, groups of schools--to enhance the clients' functioning as educators or as an educational system. (p. 180)

Louis carried a step further the Butler and Paisley conception of entitlement as a dynamic interplay between agent and client. She called for the need to view agents' roles from a user (client) perspective rather than from an agency-focused or change model perspective. She noted that external agents serve at the pleasure of the client system and must therefore adjust their roles to system expectations.* Louis (pp. 182-184) cited several studies that illustrate the role negotiation process:

> . . . the Pilot State Dissemination Program indicates that successful agents engaged in a relatively lengthy period of role negotiation . . . (Louis and Sieber, 1979)
>
> . . . on the average, administrators in client schools have an equal or greater impact on the ways in which agents spend their time, and the activities in which they engage, than either their immediate supervisors or the directors of the projects in which they work. (Louis, Kell, et al., 1981)

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*Butler and Paisley make nearly the same point: "Different client organizations create a need for the linking agent to perform different sets of linking functions, thereby moving from the center of one role in the direction of other roles" (Butler and Paisley, 1978, p. 32).

> . . . mutual adaptation between the technical assistance group and the local setting [is] . . . a prominent characteristic of successful change strategies. This process often involves conscious attempts to get feedback on strategies and roles, and to alter them to fit with the local school culture. (Moore et al., 1977)

Louis skillfully organizes her review of the empirical literature on external roles in education, and in other social fields, around two sets of variables that may influence the impact of the agent upon the client: status variables and external agent behaviors and strategies.

Status variables. Irrespective of the specificity of an agent's role, Louis suggests that the following four status variables may have a significant impact on the agent's role performance: (1) homophyly, (2) locus, (3) single versus team organization, and (4) personal agent characteristics. In the following paragraphs we briefly summarize portions of the review.

Homophyly. In the field of education, Corwin (1972) found that the greater the dysfunction between Teacher Corps participants and the schools that they served, the lower was the level of program implementation. Sieber et al. (1972) reported that the Pilot State Project education extension agents tended, at least initially, to seek out clients in positions similar to those the agents had held themselves. Moore et al. (1977) noted that successful technical assistance groups often made their own value biases highly explicit so that clients who did not agree with these biases could "opt out."*

Locus. Locus of the linkage activity, or, more simply, whether the linking agents are internal or external to their client organizations, was one of the two major dimensions on which Butler and Paisley differentiated linking agentry.** Louis noted that research evidence that attempts to compare directly the value of internal and external agents is relatively rare. However, she suggested that may be the wrong question. Corwin's (1973) study of the Teacher Corps found that both the external agents and the presence of "young, flexible, supportive" boundary persons are important in organizational adaptation. Moreover, a recent analysis of schools in the R&D Utilization Program (Louis, Rosenblum, et al., 1981) found that the involvement of external change agents, including linker "generalists" and trainers, was generally more powerful in predicting school change than when these agents were not involved, but that both internal and external agents were important.* Louis made the cogent point that

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*Butler and Paisley, 1978, pp. 23-26, approach the issue of homophyly by considering the multiple contexts (cultural, historical, political, economic, social, psychological, organizational, work) that linker and client may or may not share. They note: "The effects of context on dissemination programs are far reaching: Ultimately it is context that determines its structure and function, its scope and duration, and its acceptance and utilization by clients . . . Even within a successful program--which, according to our contention, is a program operating within favorable contexts--disparities between the specific contexts of program staff and some clients become limiting circumstances of program effectiveness." They further note that although "close-in" programs, like teacher centers, are perhaps most influenced by context, even relatively distant (from the client) programs like the Educational Resources Information Center (ERIC) are influenced, as can be seen in the demography of ERIC users, among whom researchers, graduate students, and education specialists of various kinds are overrepresented.

**Butler and Paisley (1975, 1978) further differentiated locus by level (national, state, regional, or local); by base (government-centralized, government-decentralized, professional association, university, private-for-profit, private-non-profit, consortium).

> ...the definition of external/internal depends entirely on where one stands. From the perspective of the federal government and most writers concerned with educational policy, any organization that exists below the state level represents a blurry category known as "local." From the perspective of a school-based educator, on the other hand, a specialist situated in the district office may have no better understanding of the problem of a particular school than an expert called in from several hundred miles away. (pp. 188-189)

Teams versus individuals. The general literature often favors deployment of teams because they can provide a richer set of resources and change strategies and can also provide support to one another. However, Louis noted that her recent analyses of the R&D Utilization Program (unpublished) suggest that teams consisting of more than two or three people can seriously overload the client systems, since school-based practitioners tended to have difficulty understanding the roles that each of the outsiders was supposed to play. However, the R&D Utilization study also supports the notion that the most effective strategy is one that utilizes a division of labor between an individual playing a "facilitating/generalist" role and one or more individuals who provide more specialized training around the content area in which change is planned (Louis, Rosenblum et al., 1981). Many recent efforts, as noted previously, point to the complementary need for the creation and support of locally based "teams" (Corwin, 1973; Moore et al., 1977; Emerick, 1977; Miles, Fullan, and Taylor, 1978).

Personal characteristics of agents. Just as in research in the area of leadership, one can find many lists of desirable attributes of agents, but there is really little solid empirical work that has stood the test of successful replication.

Agent strategies. In addition to the status variables reviewed above, Louis cited evidence to suggest that the following five categories of external agent behaviors and strategies may also be crucial determinants of agent role performance: (1) initiative in outreach to clients, (2) intensity of outreach activities, (3) agent expertise, (4) scope of activities, and (5) relationships with boundary personnel in client settings. In introducing this section, Louis reviewed the arguments of several authors who have argued for a "contingency" approach to understanding the relationship between change strategies and outcomes in different contexts. Louis concluded this discussion with the observation that, if one wishes to generate an effective contingency model, it is almost imperative to start at the strategy level (as defined by Hall et al., 1979).* The level of tactics is too discrete and "messy," while the game plan level is too abstract.

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*As will be seen in Chapter III, the study of Dissemination Efforts Supporting School Improvement (DESSI) also found that internal and external agents were important.

Following her own advice, Louis suggested that the following dimensions may define the choice of agent strategy.

Initiative. Initiative refers to the amount of energy and effort that an external agent must exert in order to reach the client. Both dissemination programs and agents within programs may vary widely on the dimension of initiative. Louis asserted: "There is overwhelming evidence to suggest that, in most cases, high-initiative (face-to-face, redundant) tactics will be required to stimulate wide interest in a new service that may be offered by an external agent" (p. 195). It appears that the level of initiative required to stimulate clients is associated with the research versus craft dimension (stimulating clients to use research requires greater effort), to the dimension of time/familiarity with a service, and also to specific characteristics of clients that dispose them to be "early adopters" or "laggards." However, little or no research has been done on the amount of initiative required to involve educators or educational institutions in the utilization of externally generated knowledge.

Intensity. Intensity refers to two dimensions of external agent involvement with a particular client: calendar time, i.e., the degree of long-term involvement with the client, and absolute time, i.e., the total cumulative time spent with a client. For example, Louis and Sieber (1979) found a positive correlation between total amount of time the agent spent with clients and the level of client use of information. Runkel and Bell (1976) found that in the case of organizational development (OD) training, a low level of intensity was worse than no training at all. Miles, Fullan et al. (1978), in a survey of 76 schools using OD, found that the intensity of external consultant involvement, measured in total days spent, and calendar time, measured in years, were positively related to OD program impacts and client attitudes toward OD; however, intense involvement by external consultants was negatively related to institutionalization of the OD process. Louis, Rosenblum, et al. (1981) found that several types of change agent intensity made independent contributions to R&D utilization school improvement outcomes, e.g., time spent with the principal, time spent attending meetings. Further complicating the relation of agent intensity to outcomes is the "readiness" of the client and also the nature and the stage (early, late) of the information utilization process. For example, data from the Pilot State Project indicate that when the knowledge utilization process is decision oriented, external assistance in later stages is critical. But the data from the R&D Utilization Program indicate that when the objective is capacity building, time spent by the agent in the early stages is critical, since during this period clients are most open to intensive discussion of processes, the nature and scope of their problems, alternative means of searching for solutions, etc. Research to date points to agent intensity as an important dimension that has complex and not-yet-well-mapped relationships with outcomes.

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*Hall et al., 1979, pp. 10-12, developed an empirically based taxonomy of five intervention levels: policies, game plan, strategy, tactics, and incidents. Policies are the general rules or guidelines. Game plans are the overall design for the combination of intervention strategies that are taken to implement an innovation. Strategies represent the implicit or explicit assumptions about how people and organizations function or change that guide the choices of actions (tactics). Tactics are the aggregations of incident interventions that in combination have an effect that is different from the effects of the individual incidents, which are singular occurrences of an event or action. Hall noted that, based on their empirical work, it is clear that strategies of change agents often emerge as poorly defined extrapolations of an accumulation of tactics, which may not necessarily be coherent or supportive of the intended change goals.

Agent expertise. Louis noted that, although one would assume that agents should be experts or specialists, the evidence supporting the need for technical expertise is mixed. Many authors have distinguished between content and process expertise.* However, empirical data bearing on the issue are sparse and far from conclusive. Findings are further confounded by the question of individual versus team delivery. Louis, Rosenblum, et al. (1978), for example, found that in R&D utilization projects that used both process generalists and training by program developers and other content specialists, there were differences in the degree to which each contributed to various outcomes. Generalists were more important in encouraging school staff to view their problems more broadly and to choose innovations requiring a greater scope of change. However, the overall amount and variety of sources of specialized training played a more significant role in determining the degree to which changes actually appeared to affect pupils and also the degree to which teachers reported personal growth. Both generalist support and specialized training contributed significantly to the continued use of new practices in client schools. Emerick et al. (1977) noted that generalist facilitator assistance in early stages of awareness and adoption decision stages, with developer/demonstrator technical expertise and training provided through the implementation stages, has been, by design, institutionalized effectively in the National Diffusion Network program (NDN). Louis noted that, as a research agenda, the issue of expertise will require more careful definition of terms, e.g., making distinctions between expertise that is acquired by formal training and skill that may be learned informally.

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*As we have noted in Figure 1, Piele found that levels of expertise may vary according to the roles assumed by the linking agent. Crandall (1977), Butler and Paisley (1978), and Hood and Cates (1978) have also noted the relationship between roles and levels and types of expertise.

Scope/cost. Scope of agent services refers to the number of clients that the external agent can manage at any given time. Louis notes that no studies address the issues of costs and benefits, nor is much attention paid to the impacts of increasing or decreasing the scope of activities of individual agents. Hence most of what we know in this area is based on judgments about very general findings. Louis (1975) pointed out that in the Pilot State Dissemination project, scope and intensity were negatively related. Since high initiative and front-end activities were necessary to serving high numbers of clients, increasing scope was associated with less follow-up assistance to clients after the delivery of information. Data from the NDN study (Emrick et al., 1977, p. 61, p. 122) indicate a negative relationship between high scope for NDN facilitators and outcome measures, since high-volume awareness and outreach activities tend to generate a large volume client response that makes follow-up activities with each client erratic or nonexistent. However, these follow-up activities are critical to successful NDN project implementation.*

Louis observed that the question of "large scope" versus "small scope" is relative to the program and its strategy. In the Pilot State project, a high-scope linking agent may have served 10 to 15 new clients per month, not including follow-up activities with previous clients. In the NDN a facilitator project might provide services to between three and 25 new adopters at the district level each year.** By contrast, in the R&D Utilization program, the number of schools served by a full-time linking agent over a three-year period ranged from three to 12.* Finally, a typical sucessful school district OD program may involve an external consultant for half- or full-time work over a period of several years. Louis outlined a number of factors that should be considered in planning a research agenda to examine the issues of scope.

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*In 1978, the Educational Dissemination Studies Program asked Emrick to reanalyze 1974-1976 NDN cost data by role, state facilitator (SF), or developer/demonstrator (D/D), and activity for projects and for client unit costs. These data are too detailed to report here. However, Emerick's analysis indicated that in 1975-76, when NDN was still in relatively early stages of start-up, the costs, per NDN adoption, were approximately $68 for awareness activities, $705 for training, $688 for implementation assistance, and $341 for other activities (e.g., materials development, staff training), for a total cost of services per adoption unit of $1802. Of course, not all NDN activities lead to adoptions. In 1974-75, total SF and D/D costs were approximately $4,046 per adoption. By 1975-76, these costs had dropped by more than $1,000 due to increased NDN efficiency (Paisley, Blackwell, Emerick, Rittenhouse and Cooper, 1978, pp. 37-47).

**The Emrick analysis cited in the previous footnote indicates that in 1975-76 the average NDN D/D project, budgeted at $70,000, made 2,203 awareness or demonstration contacts, conducted 90 training sessions, and provided implementation assistance to 61 schools or school districts (op. cit., p. 42).

Agencies as agents. Louis concluded her review with a discussion of the concepts of agencies as agents, citing Havelock, 1969; Corwin, 1972; Glaser, 1976; Moore et al., 1977; Lotto and Clark, 1978; Miles, 1980, and Yin and Gwaltney, 1981, and others for examples of discussions of intermediate units, colleges of education, nonprofit technical assistance groups, and other types of agencies that play various linking agent roles. Finally, Louis discussed the effect of agencies on agents. Sieber et al. (1972) had noted in the context of the Pilot State Project that agents enter into relationships with their clients carrying all the reputational baggage of the state and local organizations that sponsor them. Although in the early Pilot State Project it appeared that the sponsoring organizations were insensitive to the need for communication with and support for dispersed staff members, thereby generating job stress and dependence on clients (Louis and Sieber, 1979), the more recent R&D utilization projects indicate that increasing communication and influence from supervisors also tends to result in higher levels of job stress (Louis, Kell et al., 1981). Louis noted that there is an inherent tension among the agencies' desire to influence the job performance of agents, the desire to increase client orientations, and the need to minimize role conflict and job stress. The analysis of the R&D Utilization Program at least makes one feature regarding agent supervision and support clear: Agents are most likely to be influenced by role partners who work with them and who are accessible for feedback and interaction. Thus agents are far more likely to be influenced by the local organization in which their offices are housed than by more distant central offices or state department supervisors (Louis, Kell et al., 1981).

A research agenda. In her final section, Louis suggested a research agenda. First she noted the serious lack of theoretical frameworks in which the study of external agent roles might be located. She noted that one of the main deficiencies of research is the emphasis on a single function of knowledge use (instrumental-decisionistic) and a single type of knowledge (externally generated research information). This limited context of knowledge use research has tended to place equal limitations on research about the role of external agents. Most inquiries have viewed the agent largely within the "technological-push" framework, in which schools are seen as adopters of better research products and in which topics are defined by federal agendas, rather than by school personnel as participants in the process of determining what types of knowledge would be useful. Thus one of the derived research gaps is the general lack of research on what schools and educators want in the way of knowledge and assistance. Also needed is more information on the costs and benefits of using external versus internal agents and on the relationship between such individuals.

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*The Paisley, Blackwell, Emrick, Rittenhouse, and Cooper (1978) cost analysis of educational extension services also provides highly detailed data on percentages of time and estimated hours per site spent by R&D utilization agents working in different projects (pp. 23-36). For example, data from five of the seven projects indicate that median number of hours spent per site during the problem identification phase was 176 hours with a range from 124 to 230 hours as the average time agents in each of the five projects spent. The largest single category of service was "informing" (70 hours), followed by planning assistance (39 hours) and initiation/ motivation (35 hours). During the solution selection stage the average hours per site was far more variable across the five projects, ranging from a low of eight hours for one project to a high of 280 for another project. The median was 48 hours.

In addition, Louis noted that summative questions about the relative impact of internal and external agents should be postponed until there is an improved understanding of the relationship between the two.* Information about agent skills, skill mix, and the use of teams of agents is also extremely limited. The area of those personal characteristics of agents that are associated with "success" is probably the most murky of all the areas she reviewed. Louis advised that this area should receive low priority until a better understanding of the dimensions of agent activities can be established. In this regard, Louis noted that one of the most surprising features of the existing research is the lack of detail about agent behaviors. The main cause of this gap appears to be the emphasis on studies that involve multiple sites and cross-section designs, since such studies make it difficult to gain in-depth evidence in any detail about what agents actually do, particularly at the level of tactics and incidents. In reviewing the priorities in terms of her list of strategies, Louis concluded that the information needs are most pressing in the areas of expertise and scope/cost, since in both cases the conceptualization of the research issues is underdeveloped, whereas the policy implications are very significant. But least critical in her view is the issue of initiative, with the possible exception of unique cases that pose difficult access problems. Finally, Louis called for more attention to be paid to the ways in which organizations act as external agents.

2. School District and School Personnel in Knowledge Utilization

Michael Fullan, in a companion chapter of Improving Schools, explored what is known about knowledge use within schools and school districts. After examining the difficulties in defining the concept of knowledge utilization (KU) and considering the causes of KU in schools, Fullan examined the roles of four groups: teachers, principals, district specialists/consultants, and district administrators.

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*As will be seen in Chapter III, Louis herself provided some information on this point in the analysis of RDU project data. The DESSI study also begins to address this issue.

Defining knowledge use. With tongue-in-cheek, Fullan employed a "multistrangulation" ("It will take your breath away, if not render you unconscious") review of the range of meanings and levels that can be found in the literature on knowledge utilization (KU) in education. He started with the simple levels of knowledge use by individuals--non-users, readers, planners, implementers--and then added five "complications," namely, (1) behavioral use of information may not be the most frequent or valuable outcome; (2) sometimes KU refers to specific use of specific projects or programs, whereas at other times it refers to more diffuse uses; (3) sometimes KU is concerned with individual users, while at other times it refers to use by a group of users, such as a school or a school district; (4) there is confusion when different but overlapping aspects are characterized as a process (e.g., the Dissemination Analysis Group, 1977, definitions of four dissemination usages--spread, exchange, choice, and implementation; or the program implementation stages--mobilization, implementation, institutionalization); and (5) not only do individuals or groups receive information for their own direct use, but most of them also pass the information on to others.

Causes of KU. Fullan provided a general overview of the factors that affect knowledge use in schools by suggesting that KU is a function of three major sets of factors: the nature of information, the approach used, and the characteristics of the setting of use. After reviewing research on the characteristics of information and impact on KU in education and in other social fields, Fullan concluded: "One gets a sense of general agreement that information which is relevant, clear, amenable to action images, and so on is most effective for KU" (p. 128). He then noted that the question of determining the best strategies or approaches to facilitate KU is an enormous one. However, the main findings are that KU (in the sense of particular uses of information, such as in the adoption of an innovative project) is associated with approaches that provide direct personal forms of intervention and occur over a period of time, during which the user makes initial selection or adoption decisions and receives support (e.g., training, resources, psychological support) on a continuous basis, from initial implementation to eventual incorporation. Conversely, if we are concerned with the notion of KU as a way to diffuse and expand the use of information, what is known is much more problematic and is perhaps best reviewed by Louis (see immediately preceding sections).

Fullan then briefly reviewed a number of characteristics of the setting that inhibit or support KU, including: leadership, organizational process (communication, climate), individual characteristics, and differences in organizational structural characteristics (i.e., elementary versus secondary schools) and community characteristics (e.g., size, resources, teacher unionism). Fullan next reviewed the roles of teachers, principals, district specialists, and district administrators.

Teachers as knowledge users. Fullan considered three different KU roles of teachers: (1) teachers as direct individual knowledge users, (2) teachers as participants in planned change efforts, and (3) teachers as agents of KU. Fullan began his review by noting that, due to limited access to external sources of information, the isolated nature of their work, and heavy teaching loads, teachers are frequent users of neither research knowledge nor practitioner knowledge. However, much of the research on teachers as users seems to ignore the diffuse, longer-term impact of educational knowledge that teachers pick up through workshops, readings, casual discussion, and so on. Surveys of teacher use of sources of information (Hood and Blackwell, 1976) and of studies of teacher planning (Clark and Yinger, 1980) have suggested several points: (1) teachers rely heavily on personal sources; (2) the heavy emphasis teachers place on face-to-face discussions within schools may indicate that more KU exchanges occur than is commonly known;* and (3) the heavy emphasis teachers place on use of textbooks and curriculum materials points to another unknown area of KU. There is some evidence that textbook publishers and salespeople are major disseminators of curriculum knowledge.

Teachers as participants in planned change. This literature tells us that KU among teachers occurs when:

> . . . (a) the information is of a certain character (relevant to needs, specific in an application-implication sense, perceived to be valid/accurate); (b) the approach is person-intensive, interactive, and continuous in providing technical and psychological support; and (c) the setting (district, school) possesses characteristics of administrative support, peer interaction, and problem solving behavior. All three sets of factors must be present if any widespread KU is to occur--apparently, this is something which infrequently happens. (Fullan, 1981, pp. 225-226)

Teachers as agents of change. Fullan has pithily summarized a brief review of research on teachers as supporters of KU as follows: "Teachers do not frequently interact on professional instructional matters, but when they do, it can be very powerful in affecting KU" (p. 226). After reviewing research based on adoptions of innovations in 13 high schools (Daft and Becker, 1978), a national survey of innovations reported by superintendents (Havelock, and others, 1973), Barrows' (1980) study of adoption activities in 13 schools that adopted Individually Guided Education (IGE), and several other studies, Fullan offered these tentative observations regarding teachers as initiators of change:

> (1) Teachers as a category may be responsible for and/or play key roles in many instances of KU, but this does not tell us anything about the average KU instigation of teachers. Indeed, other evidence indicates that the average teacher is not engaged in these efforts. Nor do we know much about the average KU of individual teachers (as distinct from the initiation of KU).
>
> (2) When teachers do push for change, it is likely to involve curricular, classroom-related innovations. More

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*However, ethnographic descriptions of teachers in informal social situations in schools suggest that many teachers deliberately avoid discussions that would result in the exchange of school-oriented KU. Later in his review, Fullan (p. 226) made essentially the same point.

> comprehensive schoolwide or district changes come from other sources.
>
> (3) The Daft and Becker (1978) and Havelock et al. (1973) research does not assess "utilization," but only initiation or adoption. Therefore, conclusions about firm KU are unwarranted. Moreover, little is known about the process of mobilization--those activities, events, and KU behavior which lead up to a decision to adopt an innovation.
>
> (4) Teachers are important sources of support or lack of support for KU of other teachers, whether it be individual or group-based use.
>
> (5) In sum, research is needed on: (a) the role of teachers in the processes of mobilization and decision to adopt; (b) average KU behavior of teachers; (c) elementary and secondary school differences; and (d) the different processes according to variations in rural, suburban, urban, district size, and other contextual conditions. (Fullan, 1981, pp. 227-228)

Principals as agents of KU. Fullan opened this topic by noting that after 20 years of meaningless generalities depicting the principal as the gatekeeper of change, there is finally some very sound and detailed research currently being conducted on the role of the principal vis-a-vis change. Fullan has demonstrated his point in an extensive review of large-scale surveys and focused research studies. From this review he concluded that, though on a per capita basis principals have much more opportunity for access to external sources of knowledge than do teachers, the majority of principals do not take advantage of, or their work situation does not support them to use, these sources of information. However, the most effective principals (by reputation) do draw more extensively on external resources, and they cite curriculum or instruction as a higher priority than do less effective principals. Moreover, Blumberg and Greefield (1980) also pointed to the enormous amount of information processing internal to the school that effective principals carry out. In viewing principals as *agents of KU*, Fullan concluded:

> Research consistently found that a large percentage of principals (at least one-half) were preoccupied with *administrative* work and organizational maintenance activities. Of the other principals, the exact role in KU was somewhat ambiguous and variable. There was some evidence that *direct* leadership in instruction was strongly related to KU (see Wellisch et al., 1978), but other evidence that it may be dysfunctional (Leithwood et al., 1978). By contrast, *facilitative* Leadership by principals was found to be effective (Leithwood et al., 1978).
>
> These are not necessarily incompatible findings. There are at least three aspects of the problem which need to be clarified. First, we need more operational definitions

> of directive and facilitative modes. It is likely that different components and meanings are currently being included. For example, directive can range from having a clear instructional image to authoritarian imposition of poorly thought out or centrally directed programs. Facilitative can range from a laissez-faire relationship to teachers to one of active support. Second, it is possible (and there was some evidence to support this) that effective elementary school principals play a more direct instructional role, and secondary school principals carry out a more indirect role. Third, returning to the multidimensional nature of KU, it may be that centrally derived programs are more effectively used by directive principals (when they agree with the program), and individualistic KU is better served by facilitative principals. Despite these variations, the research reviewed was clear that some form of active involvement and support by the principal was essential for KU by teachers. Furthermore, these principals had been effective at coping with (delegating, reprioritizing) administrative processes that preoccupied their colleagues.
>
> Finally, the research was in agreement that the principal, in a positive or negative way, is critical--in fact, may be the most critical agent--for KU of teachers. (Fullan, 1981, p. 240)

District specialists/consultants. Fullan introduced this topic by observing that internal agents are probably more critical for KU than are external consultants because of the necessity for continuous personal interaction. District staff are among the most likely persons to play this internal agent role, but there is not much specific research. The evidence we do have suggests that district consultants are not particularly effective, but that they can be, depending on how they are organized and how they carry out their work. After reviewing nearly a score of studies, Fullan concluded this review as follows:

> In summary, we can draw four main conclusions about the role of district consultants:
>
> 1) There is limited research and underestimation of the potential role of district resource staff.
>
> 2) District staff are crucial for introducing new ideas and facilitating ongoing interaction, dialogue, help, and support.
>
> 3) While district support staff are crucial, they are infrequently effective because (a) as individuals they often carry out their work on a one-to-one or one-to-group workshop basis, rather than on the basis of an approach geared to the management of collective change. Stated another way, district consultants themselves are not good knowledge utilizers when it

> comes to theories of implementation (they may be good KUs in regard to curriculum content); (b) districts have not set up organized program units as part and parcel of system planning and implementation.
>
> 4) One of the greatest gaps in our knowledge is that we have only research on district specialists as a category. In reality, there are many different roles and forms of organization across districts. For example, it seems that in some cases district specialists may include administrators such as curriculum directors, while in others they may be excluded. In addition, there are a variety of staff specialists: some are general curriculum consultants, others are subject-area consultants, and still others provide special services in counseling, special education, and so on. In short, more specific research is needed to describe and examine the major line and staff roles commonly included under the general label of district specialists. (Fullan, 1981, p. 245)

Superintendents. For years, all major research on educational innovation has shown the school district superintendent as being critical if change is to occur in the system. But Fullan has observed: "However, we now know that superintendent 'adoption' of new programs often bears little resemblance to 'use' of these programs by teachers" (pp. 245-246). The more recent research literature shows that general support or endorsement of a change may mean very little for subsequent implementation.* Fullan has distilled a review of research on the role of the superintendent in KU as follows:

> In summary, the findings on the role of the superintendent in KU are inconsistent, ad hoc, and incomplete. A series of observations and recommendations can best describe what we know and need to know.
>
> 1) As a generalization, it can be suggested that superintendents are important either for initiating or supporting KU efforts in school districts.
>
> 2) This generalization does not take us very far. We really do not know what superintendents do. Under what conditions do superintendents initiate or support? What is meant by initiating, and by facilitating? How do superintendents in different size school districts vary in their roles? What is their relationship to,

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*In Chapter III, one of the remarkable DESSI study findings will show the lack of any significant relation between superintendent support and any of the several individual or school-level outcomes measured.

> and what are the roles of, other central office administrators and specialists (assistant superintendent, curriculum director, district consultants, and so on)? One would expect enormous differences in urban districts of 150,000 students compared to small town and rural districts with a few thousand students--the latter of which make up the large majority of school districts. Nor do we know the organizational structure, roles, and procedures as they vary across districts.
>
> 3) In summarizing the research needs in relation to the superintendency and KU, the following points should be made:
>
> a) We need good, basic, demographically representative studies of the role of superintendents in KU. These should include how superintendents as individuals use knowledge in their work, and how they relate to other central staff and to schools in initiating, supporting, or facilitating KU. Variations in the nature of the role of superintendents at each of the three main phases of mobilization, implementation, and institutionalization should be examined carefully, as well as the proportion of superintendents who are involved in KU efforts at school districts. As with the principal, studies are needed of how effective superintendents manage conflicts and role overload in order to devote some attention to KU for school improvement. Size, type of school district, and geographic region would be the main bases of framing the sample.
>
> b) Similar research should be carried out on the immediate subordinates of the superintendent (assistant and deputy superintendents, curriculum directors). These central administrators play a more direct role in KU in many districts, and little is known about the work they do, their relationship to superintendents, and so on. Not the least of the problem is to come to grips with the myriad of titles and organizational structures, so that one can compare practices across districts. (Fullan, 1981, pp. 248-249)

After outlining a recommended research agenda for each of the four key groups, Fullan made this final statement:

> The main assumption in this chapter has been that individuals and groups internal to the district are the most important agents for KU. This corresponds to the main findings in the implementation literature, that the characteristics of local settings dominate what happens to new ideas (see Berman and McLaughlin 1978). If this is the case, the

> review has identified some critical research gaps, since research knowledge about the KU roles of personnel internal to the district is very underdeveloped. Current emphases in the research literature on federal policies and programs (for example, Raizen, 1979; Turnbull, 1980) and external linking agents (Louis, 1980) are important, but should be counterbalanced by equally intensive research on teachers, principals, district staff, and superintendents within school districts. (Fullan, 1981, p. 251)

III. SYNOPSES OF THE STUDIES

Description of the Scope of the Current Synthesis

In the immediately previous chapter, we drew heavily on two very recent reviews of research by Karen Louis and by Michael Fullan to provide some sense of what these reviews have concluded from extensive surveys of literature in the field of education and in related social fields. In this chapter, we shall use a different approach by making a far more intensive review of five very recent studies:

A. Building Capacity for Improvement of Educational Practice: An Evaluation of the NIE's State Dissemination Grants Program

B. A Study of Dissemination Efforts Supporting School Improvement: A Study of Four Federal Programs

C. Linking R&D With Schools: The Study of the NIE Research and Development Utilization Program

D. The Research for Better Schools (RBS) Local School Improvement Study

E. The RBS Study of Regional Education Service Agencies in New Jersey and Pennsylvania

The first three are very-large-scale, multi-year studies of major federally sponsored dissemination programs that employed external and sometimes local, linking agents as part of their dissemination strategy. The two studies by RBS are much smaller in scale and in geographic scope but add useful additional information. All five of these studies provide significant information on the role of external agencies and linking agents as facilitators of local school improvement efforts.

Moreover, with the possible exception of the compliance and enforcement strategies employed by some of the regional service agencies (described by RBS researchers) and the Bureau for the Education of the Handicapped Marketing Program strategies (one of the four federal dissemination programs studies by DESSI) all the programs studied placed very heavy emphasis on various forms of rational knowledge utilization that have combined (a) delivery of externally generated forms of knowledge, often representing new curricula, instructional practices, or instructional planning and management methods, with (b) various types of knowledge utilization process assistance. The studies thus report in a fairly coherent fashion many variations of one generic school improvement strategy, i.e., the provision of externally generated knowledge along with external human assistance to local schools in its use.

In sum, more than 40 specific projects/programs are described. The studies provide data on more than 400 linking agents who helped schools implement more than 200 different innovations. School effects data on 300 school sites are provided, based on researcher site visits to the schools, plus surveys and interviews of more than 4,500 teachers, principals, and other staff. In addition, more than 60 case studies of individual school sites were prepared. Excluding the case study reports, which total several thousand pages, and scores of interim reports, the final, or latest available, reports on which this synthesis is based amount to more than 20 volumes totaling more than 1,500 pages. In the following sections, we present a summary description of each study, including:

- a brief description of the program/projects studied
- a synopsis of program assumptions with respect to school improvement
- a description of the study methodology
- a review of key overall study findings
- a summary of key findings with respect to linking agents

A. Building Capacity for Improvement of Educational Practice: An Evaluation of NIE's State Dissemination Grants Program

1. Program Description

In most states, one or more units in the state education agency (SEA) are assigned responsibilities for disseminating information to the education community as a means of facilitating improvement in education. Although the activities of these SEA dissemination units differ, they generally perform three functions: (1) collect and organize information resources, (2) deliver pertinent information to clients, and (3) assist clients to varying degrees in using information.

In 1975, the National Institute of Education (NIE) established the State Dissemination Grants Program (SDGP) which provides grants to SEAs to help them design, implement, and institutionalize more effective SEA dissemination systems. Based on the findings of the Pilot State Dissemination Program (Sieber, Louis, and Metzger, 1972; Louis and Sieber, 1979; Louis, 1981), the State Dissemination Grants Program conceptualized a system comprised of three components: (1) an information resource base, (2) linkages to connect resources with clients, and (3) coordination of dissemination activities within and outside the SEA so that clients could use the system.

Although linkages between clients and knowledge bases could be accomplished through telephone and correspondence, the Pilot State Dissemination Program had demonstrated the effectiveness of the use of field agents, analogous to the agricultural extension agent, who made contacts with school and district office personnel and engaged in a variety of activities. These included helping to define local needs and priorities, identifying needs for information, communicating these needs to information resource base staff, delivering retrieved information, providing assistance in applying pertinent information, and arranging for appropriate additional assistance.

2. Program Assumptions

NIE staff knew that SEAs varied greatly in their organization and in their approach to school improvement; hence no one model or approach to developing a SEA dissemination system would fit all SEAs. The NIE capacity building program focused on three components, (1) knowledge base, (2) linkage, and (3) coordination; these were three areas where all SEAs might make improvements. Implicit in the focus on building, upgrading, and coordinating the SEA knowledge base was the assumption that the ERIC system and other information about educational practices, products, and programs could provide valuable resources for promoting practice improvement. The focus on building, supporting, and expanding linkages was based on the assumption (well demonstrated in the evaluation of the Pilot State Dissemination Project) that these knowledge resources would have relatively little impact on practice without the active promotion and assistance of personal linkages between practitioners and the information base. The emphasis on coordination acknowledged the fact that in every SEA numerous Federal and state programs carried on their own dissemination efforts, often involving SEA units and other organizations throughout the state. It was assumed that by exercising leadership, the capacity-building project staff could promote coordination of these separate SEA knowledge bases and linkage systems so that practitioners would gain easier and more effective access to the full range of SEA information assistance.

3. Study Methodology

NIE issued a contract to the NTS Research Corporation to undertake a multi-year (October 1976-April 1980) study of the program. The basic objectives of the NTS study were: (1) to describe the state dissemination capacity building projects and the SEA dissemination systems within which those projects were located; (2) to describe the factors affecting the development and institutionalization of SEA dissemination systems; (3) to review NIE's management of the program and its operational procedures and to examine how those related to operations at the project level; and (4) to derive policy recommendations that might help to improve the SDGP and future dissemination programs. Sources of data included: (1) two waves of data collection by field interviews, site visits, and survey questionnaires (1978, 1979) from the first three of five cohorts of projects, (2) additional data collection (1979) from two more cohorts of states and from non-program states;* (3) case studies of five projects; (4) interviews with NIE personnel; and (5) review of existing documentation (proposals, quarterly reports, statistical data, etc.). The purpose of the study was not to evaluate the success of specific projects, but rather to identify factors that facilitate or impede SEA efforts to build and institutionalize state dissemination systems. The study focused on primary program effects, i.e. development of dissemination capacity, rather than on secondary effects such as client use of that capacity. Thus, the NTS study provides no direct information on the impact of the program on schools or information users in schools.

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*Although by the conclusion of the NTS study 44 SEAs had participated in the program, data on linker service activities and location of linkers were described for only 29 states as part of the 1978 and 1979 data collection effort. A more intensive study of 307 linkers located in ten states was also accomplished, and a separate substudy of project directors' perceptions of linker roles included 25 state project directors.

4. Key Overall Program Findings

The NTS study concluded that the primary effect sought by the program--increased capacity of SEAs to accomplish dissemination--was being achieved. States had substantially increased the breadth and variety of the knowledge resource bases that could be accessed by clients within and outside the SEA. States had developed or increased their capacity for delivery of information to clients through "linkers" who functioned as information brokers. Further, the coordination of resources for dissemination had been improved somewhat, although most improvement in this area involved increased coordination between the projects and generic programs such as the National Diffusion Network (NDN) and ESEA Title IV-C innovation diffusion efforts; less coordination was achieved between the project and content specific programs such as vocational, compensatory, or handicapped education.

The process of increasing SEA capacity followed different patterns, depending on SEA history and context. Resource base development expanded primarily in the areas of developing "promising practices" files and other state and local information files. Three different linkage patterns ("controlled," "coordinated," and "external") were found, tending to reflect SEA philosophy regarding its role vis-a-vis local education agencies (LEAs) in school improvement.

Factors affecting project success. State, NIE program design and management, and other structural factors appeared to influence the success of project efforts to implement and institutionalize dissemination systems. Favorable state factors included continuity of energetic, entrepreneurial leadership; previous experience with dissemination activities; placement (placement in an administrative unit favored development of coordination and comprehensiveness of the system, but placement in a service unit assisted in the delivery of services to clients and enhanced the institutionalization of the system in the SEA); initial priority targeting of clients for service with later moves to serve the general clientele; active support of top SEA administrators; and absence of stringent SEA budgets or changes in agency leadership. Favorable NIE program design and management factors included: collaborative planning between NIE and the projects; flexibility of the program guidelines; and provision of opportunities to communicate with persons from other states and agencies. On the other hand, lack of specification of program objectives in relation to other SEA school improvement efforts; vague goals and uncertain means for increasing equity of access and service; and limited NIE staff resources were factors that inhibited program success. The continued fragmentation of dissemination components of other federal programs was the major other structural factor that impeded the building of generalized, and comprehensive dissemination systems within the SEAs.

5. Key Findings Regarding Linking Agents

Location and function. As with the development of other components of the SEA dissemination systems, the SEAs varied widely in the number, organizational location, and manner of use of human agents (linkers). Among the 29 states surveyed in 1978, some 4,354 persons were identified as "linkers." When cross-classified by location and by type of service provided, the percentage of linkers were distributed as displayed in Table 1.

Table 1. Percent of 4,354 Linkers Cross-Classified by Linker Service Activities and Location of Linkers

	LOCATION OF LINKER				
TYPE OF SERVICE	SEA	Intermediate Unit	LEA Office	School Building	TOTAL
Spread only	2	0	27	9	38
Spread and Exchange	1	1	15	8	25
Spread, Exchange, and Choice	2	-	2	0	4
Spread, Exchange, Choice & Implementation	17	9	7	0	33
TOTAL	22	10	51	17	100

This table indicates that more than two-thirds of these linkers were located in local education agencies, either in the school district office (51%) or the school building (17%). If located in the school building, the linkers' role was confined exclusively to serving as an information conduit (spread only, e.g., promotion of awareness of services; or spread and exchange, e.g., communication of user information needs and delivery of retrieved information). If linkers were located at the central office, those were still the most frequent linker roles. Less than one in five LEA office-based linkers went beyond information exchange to assist users in choosing among alternatives or to assist in implementation. However, implementation assistance tended to be the major role played by linkers (three out of every four) who were external to the LEA, i.e., based at the SEA or in an intermediate unit.

Among the 24 states where linkers were assigned implementation responsibility, eight different configurations of linker location patterns were found: SEA only (6); Intermediate Unit only (4); LEA only (2); SEA and Intermediate Unit (6); SEA and LEA (2); Intermediate Unit and LEA (1); SEA, LEA and Intermediate Unit (2); and SEA, Intermediate Unit, and Post-secondary Institution (1).* Half the SEAs that assigned implementation tasks to linkers depended on linkers located in only one type of agency; the other half of the SEAs used linkers in a combination of two or more types of agencies.

Linkers and the resource base. Three predominant models of linker-resource base relationships were found: non-coupled, loosely-coupled, and coupled. In the non-coupled model the resource base and the linker did not have any formally defined ties or relationships other than that the SEA resource base existed as a service unit for linkers. In the loosely-coupled model there was greater coordination or cooperation (and sometimes formal relationships) between the resource base staff who were usually in the SEA and the linkers who were usually personnel of intermediate units, which may or may not be part of the SEA. In the tightly-coupled model, the linkers and the resource base were housed in the same SEA unit and reported to the same administrator, thus enforcing a higher degree of coordination between the two components.

NTS found that higher degrees of coordination between linkers and information resources occurred in projects that utilized cadres of SEA- or intermediate unit-based linkers, employed more full-time linkers, or were in states that had a higher absolute number of school districts (irrespective of enrollment statistics). NTS also found the coordination of linkages was more likely to occur in states that had not made an attempt to build a maximally comprehensive resource base. Also, coordination between linkers and the resource base occurred most readily when the project first followed a targeted client approach that allowed linkers to learn to establish relationships with specific resources and SEA staff staff best suited to the needs of particular subsets of the client population, rather than attempting, from the beginning, to meet information needs of all classes of clients.

Relations of linkers to SEA school improvement functions. A second primary consideration regarding linker configurations concerned the degree to which project linkers were incorporated into the existing SEA structure for school improvement. Again three predominant patterns were identified: (1) cases where the SEA dissemination functions and its school improvement efforts were completely integrated; (2) cases where the SEA dissemination functions and SEA school improvement functions operated separately but in a way that complemented or compensated for other SEA school improvement efforts--i.e. partially integrated; and (3) cases where the two efforts were totally separate operations (often due to differences in location or to differences in philosophy regarding change strategies or appropriate roles to be played by a state agency vis-a-vis local schools. Moreover, SEAs differed in the degree to which the SEA pursued an active school improvement effort (see McDonnell and McLaughlin, 1982).

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*Only 11 of the 4,354 agents were located at Post Secondary Institutions.

Linkers and other SEA dissemination efforts. Beyond the issues of linker coupling to the resource base, and the relationship of project-supported linkers to SEA school improvement efforts, lay the issue of the relation between the project and various other linker groups. Among ten types of SEA staff, three groups of program linkages were identified: 1) with dissemination specialists, including resource base staff, National Diffusion Network (NDN) staff, and ESEA Title IV-C staff; (2) with program-specific specialists, including staffs of compensatory education, vocational education, special education, early childhood, adult, migrant, and career education; and (3) with state library system staff. Generally, the most frequently developed linkages were with resource base staff and ESEA Title IV-C and NDN staff (all dissemination generalists), and the least developed linkages were with migrant education, early childhood education, and state library system staff. When examined in terms of time trends, most projects were found to have first involved elements at the SEA that were organizationally close, and then proceeded to enlist persons closer to local schools, most notably intermediate education agency staff.

When examined in terms of relationships with other variables, comprehensiveness of program linkages (extent to which a number of different linker groups were involved with the project) was associated with project placement in an administrative (as contrasted to a service) unit, with the degree to which the project targeted communications but progressively generalized its services to all client groups, and with the degree of SEA centralization (more centralized SEAs were in a stronger position to establish and maintain relationships among their program staff).

Activities, roles and expectations for linkers. In a separate sub-study (Decad, Madey, Royster, and Baker, 1981), NTS researchers took a closer look at the actual and ideal patterns of activities as perceived by linking agents themselves and by project directors. In all, seven sets of data were examined. Six involved "real" or "ideal" 5-point (1 = never; 5 = usually) ratings of 13 selected linker activities identified by Butler and Paisley (1978)* supplied by (a) 136 linking agents in six states in 1979, (b) 307 linkers in ten states (including the 136 linkers in the first sample), and (c) 25 project directors. The seventh set of data comprised information supplied by the 25 project directors concerning SEA contextual, project, and dissemination system characteristics, supplemented by additional state and school data obtained from the National Center for Educational Statistics. Each of the first six sets of data was separately factor analyzed (principal axis analysis solution, followed by varimax rotation with three factors retained in each solution). The resulting factor patterns for the six analyses (three samples by two sets of responses-"actual" and "ideal") were highly similar. All yielded essentially the same three factors (Facilitating, Resource Finding, Communicating). The following paragraphs describe the results for each factor.*

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*Butler and Paisley (1978, p. 33) identified 15 linking functions. (See Figure 2, Chapter II.) Only 12 of the items are included in the NTS reporting. Two items, Evaluating, and Monitoring Products, were not included in the NTS instrument. A third item, Managing Conflict, was on the instrument but was dropped, apparently because it did not correlate very well with any of the other items.

Facilitating. The facilitating role was primarily defined by four activities: Implementing (assisting clients to install a new procedure), Producing (developing materials or procedures for client utilization), Influencing (promoting concepts and ideas for client utilization), and Planning (preparing for future needs and services). An additional item, Intervening (proactively seeking client needs) does not load highly for linkers' activities in the "real world," but was included in the analyses for linkers in the "ideal" world and for both the "real" and the "ideal" responses of project directors.

Resource finding. This factor was primarily defined in terms of three activities: Analyzing Problems (translating client problems into information and resource needs), Analyzing Information (determining the relevance of information to client problems), and Collecting Information (securing and arranging information for client problems). The "ideal" responses of linkers and project directors differed remarkably on this factor. In an "ideal" world, linkers would add Marketing (promoting awareness of available services) and Intervening (proactively seeking client needs) to the resource finding role, but project directors in an ideal world would add Monitoring (keeping abreast of recent education practices and innovations) and Planning (preparing for future needs and services). We thus see in the ideal ratings a common concern with improvement of future services, but with a client-oriented bias among linkers as contrasted to a resource-base bias among project directors.

Communication. The communication role was defined most consistently across the six analyses in terms of three activities: Communicating (maintaining open personal communication with clients), Disseminating (sharing information with clients in a two-way process), and Marketing (promoting awareness of available services). However, the loading of Marketing was diminished appreciably for linkers' ideal ratings. Linkers' ideal ratings tended rather to emphasize "planning for future needs and services" as part of the communication function. Monitoring ideas (Keeping abreast of recent education practices and innovations) showed moderate

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*These three factors extracted 68 percent of the variance in the set of 12 items. Following Varimax rotation, the variance percentages were as follows: Facilitating (47%), Resource Finding (13%), and Communicating (8%).

(.4 or higher) loadings for all analyses except the project director-ideal. Intervening (proactively seeking client needs) displayed moderate loading (.4 or higher) in all three "real" analyses, but very low loading (none higher than .14) in any of the three "ideal" analyses. Apparently the need for Marketing and Intervening, i.e., making clients aware of linking agents' services and linking agents aware of clients' needs, would diminish in an ideal world where presumably agents and clients would maintain long-term "communication" relationships.

When compared to the Butler and Paisley (1978) conceptualization, the NTS factor analyses showed that *Resource Finding* corresponded directly to the "resource finding" role described by Butler and Paisley. *Facilitating* (Implementing, Producing, Influencing, and Planning) involved a combination of activities associated with Butler and Paisley's "solution giving" and "process helper" roles. *Communicating* corresponded to Butler and Paisley's "generalist" role.

Linker types. The next question the NTS researchers addressed was how the three linker "roles" identified by the factor analyses were combined as linker "types" or profiles. Rather than turning directly to cluster analysis or an inverse factor analysis solution, which would have preserved much of the available rating scale information, the NTS analysis proceeded by first assigning each linker a "role score" based on the average of the ratings for the activity items that loaded highest on each factor, then arbitrarily tricotomizing the score into High (H) (>3.33 on the 1 to 5 pt. scale), Medium (M) (2.67 to 3.33), or Low (L) (<2.67). (Because the averages for items included in the Communicating role score were approximately one half an item standard deviation above the averages for Facilitating or Resource Finding, substantially higher proportions of linkers were classified as H or M on Communicating, as compared to Facilitating or Resource Finding.) After each linker was classified into one of 27 possible types, these types were reduced to seven types by ignoring level and looking at relative patterns, e.g., a "pure facilitator" type might display any of three patterns HLL, HMM, or MLL, where the first value is for the facilitating score. Conversely, a resource finder/communicator (i.e., *not* facilatator type) might display any of the following patterns--LHH, LMM, LMH, LHM, MHH--again where the first value represents the facilitator score.

In this fashion three "pure" and three "combined role" types were formed. Finally, an "eclectic" (undifferentiated?) type was recognized (i.e., HHH, MMM, LLL) where all three scores fell into the same level.*

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*Placing a linker who rated most items in all three factor sets as done "usually" with a linker who rated most items in all three sets as done "never" (or "rarely") in the same "type" seems to stress the logic of "homogeneity of profiles" past a point of practical interpretation.

When so typed, the 136 linkers (from six states) were classified as follows (see Table 2):

Table 2. Linkers Classified by Type

TYPE	NUMBER	PERCENT
Eclectic	44	32 %
Communicator/ Resource Finder	29	21
Communicator/ Facilitator	27	20
Communicator	23	17
Sub Total	(123)	(90)
Resource Finder	8	6
Facilitator	2	1+
Facilitator/ Resource Finder	3	2
Sub Total	(13)	(10)
TOTAL	136	100

Table 2 indicates that "eclectic" linkers, who tend to give approximately equal frequency to the performance of all three roles, are the most numerous type, representing nearly one third of the linkers found in this six state sample. However, linkers who placed major emphasis on communication or communication with one other role constitute 58 percent of the entire sample. By contrast, linkers who place a relatively higher emphasis on resource finding and/or facilitating (than on communicating) constitute no more than ten percent of the sample. Clearly, communication is the predominant role among most of these linkers, however they are typed.*

Comparison of "real" and "ideal" perceptions of linker activities. T-test of differences between means for all 12 activity items and three role score averages were computed for all six possible comparisons between linker "real" and "ideal" ratings (from six states) and project director "real" and "ideal" ratings (from 25 states). In addition, comparisons were made on a descriptive basis between linkers and project directors for the six states with linker data. These analyses produced the following NTS conclusions:

1. Communicating and Disseminating are consistently the most extensively performed and preferred activities, from both linkers' and project directors' perspectives; the least performed and preferred activities are Intervening (proactively seeking client needs) and Producing (developing materials and procedures for client utilization.

2. Linkers want to be more extensively involved in all the activities; however, there were qualitative differences between their "real" and "ideal" conceptions of their roles, towards wanting to be increasingly involved in the more comprehensive functions within the school improvement process.

3. Project directors' responses were notable in that they basically wanted the linkers to perform each activity with at least the same relative level of effort; those activities that they wanted linkers to do significantly more of tended to involve direct services to clients' specific information needs and problems.

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*Means for the *communicating role* are consistently the highest of all three roles means for linker real, linker ideal, project director real, and project director ideal ratings. Moreover, means for the two *activities*, communicating and disseminating, were consistently the two *highest means* for all four types of ratings. Finally, these were the activity areas where "ideal" ratings significantly exceeded actual ratings for both linkers and project directors. From the standpoint of the porportions of linkers by types reported in Table 2, it should be noted that, of the 136 linkers typed in Table 2, 89 were located at the LEA, 30 at intermediate units, nine at the SEA, one at a postsecondary institution. No data on organizational affiliation were available for seven linkers. With more than two-thirds of the classifiable linkers located in LEAs, and given the data on linker service activities presented in Table 1, it is not particularly surprising that the communication (i.e., spread and exchange) activities would be most prevalent. It is also not surprising that "facilitator types" (i.e., spread, exchange, and choice/implementation) would be so few in number. More than three-fourths of the "facilitator" linkers in the population (see Table 1) were located in SEAs or intermediate units, yet linkers from these types of organizations contribute less than one-third of the sample.

4. Of all the comparisons, those between the linkers' and project directors' "real" responses were the most congruent. However, some discrepancies did exist. For example, project directors placed a much lower value on collecting and organizing information; ideally, they would probably delegate this activity to a resource base specialist and utilize linkers to a greater extent for analyzing client problems and analyzing the resultant information package. Similarly, project directors placed a low priority on producing and implementing activities, probably because these activities can be served by others in the SEA; for example, media or content specialists may produce materials and NDN facilitators may help clients implement new procedures.

5. The results of the analysis within states seem to suggest that there was probably a "wash-out" effect when responses were aggregated across states, and that substantial differences do exist between linker and project director perceptions.

6. The analysis within the six states which matched project directors and linkers suggests that some activities (e.g., Implementing, Influencing) may not be clearly defined, and discrepancies might be attributed to different perceptions of what is involved in performing a particular activity.

(Decad, Madey, Royster and Baker, 1981, pp. 42-43)

A search for explanations of variations in linker roles. Using data from the 25 projects where project directors had supplied data on their perceptions of linker "real" activities, in conjunction with other data on state, SEA contextual, project, and dissemination system characteristics, NTS researchers undertook a search for explanations in variation among the 25 project directors perceptions of real linking agent activity. These findings can be summarized as follows:

- The extent to which project directors perceived linkers performing each role ("real") was related to project characteristics and characteristics of the linking agents themselves.

- No relationships were found between perceived linker activity and state or SEA contextual characteristics.

- The extent to which project directors perceived their linkers performing the communicating role was associated with project directors' ratings that their linkers were able to develop satisfactory relations with clients, able to undertake and analyze a wide variety of problems in a nontechnical manner, and able to assist school people in planning and implementing new programs contextually. High communicator role ratings were associated with projects that used part-time linkers who were external to their client organization. High communicating was also associated with other personnel who received linker training, primarily generalists who were formerly subject-matter content specialists.

- The *resource finding role* was primarily associated with the number of *full-time* linkers used by the project irrespective of their location the SEA, intermediate unit, or LEA level. The major source of support for linkers fulfilling this role was intermediate unit funds. Resource finding was associated with the use of school board members and regional and special education staff as project linkage elements.

- *Facilitating*, perhaps the most comprehensive of the three roles since it involves planning, influencing, producing, and implementing activities, was related to the degree to which various dissemination activities of the SEA were coordinated or centralized and also to past participation in the Nine State Study (a small-scale, "operational" test of SDGP). This role tended to be associated positively with part-time, intermediate-unit-based linkers (and negatively associated with full-time linkers) and with those who primarily were trained linker *specialists* (rather than *generalists*). This role was associated with the availability and use of NDN staff. Funding for linkers serving the facilitator role was positively associated with federal funding for linkers (primarily from ESEA Title IV and NDN sources) but negatively associated with direct SDGP funding. This role was also associated with most of the variables that measure SEA size, i.e., the facilitating role was relatively most frequent in states with a large LEA client base.

- The associations found for *facilitating* and *resource finding* probably reflect the demands of these roles required by linkers performing more complex functions.*

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* Table 1 indicates that only a third of the SDGP linkers were classified as engaging in all four dissemination functions (spread, exchange, choice, and implementation). Over 60 percent of the more than 4,000 linking agents identified by the NTS study of SDGP provided only "spread" or "spread and exchange," i.e., primarily communication role services.

B. A Study of Dissemination Efforts Supporting School Improvement.

1. Program Description

In 1978, the United States Office of Education, now the U.S. Department of Education, commissioned The NETWORK, Inc. (Andover, MA) to undertake a massive Study of Dissemination Efforts Supporting School Improvement (DESSI).* As the first step, researchers studied how each of many existing federal and state dissemination programs were structured, how they functioned, and how they interacted with local conditions and forces. Then, in order to develop a rich array of contrasts and comparisons, they selected 146 local sites, located in ten states, that had implemented a total of 61 different innovations. These innovations were sponsored by four different programs, each representing a different approach to school improvement. Three programs emphasized dissemination of products and practices developed outside user schools: The National Diffusion Network represented the face-to-face approach. The Bureau of Education for the Handicapped Marketing Program typified a non-personal materials marketing approach. ESEA Title IV-C adoption-adaptation projects exemplified the state-administered dissemination approach. In contrast, the fourth program, represented by Title IV-C local development projects, emphasized local development of new products and practices.

The primary focus of the DESSI research was on the dynamics of local implementation effort. Each local effort was connected with a single federally-sponsored activity, explicitly designed to encourage and support school improvement. The four strategies were selected after extensive case study of 15 of the 45 dissemination and dissemination-related federal programs considered in the DESSI study. The four programs employ strategies that can be distinguished in terms of the locus of initiative (federal-state-local), the extent of interpersonal assistance (much to virtually none), and the locus of such assistance.

In particular, DESSI researchers wanted to know how various persons assisted or inhibited school improvement efforts. They wanted to explore the contributions of those in the immediate vicinity of the user teacher (i.e., other teachers or school staff and the building principal), as well as those typically more distant from the daily routine (i.e., central office staff and facilitators who were external to the school district.)**

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*The NETWORK was joined in this collaborative study by the Research and Development Center for Teacher Education, University of Texas, Austin; the Knowledge Transfer Institute, American University, Washington, D.C.; the Center for Policy Research, New York, N.Y.; and the Center for the Study of Evaluation, University of California, Los Angeles.

**Methodologically, the DESSI study approach is clearly the most "site-based" of the studies considered in this synthesis. The NTS study did not provide data on school site effects. The other studies (RBS and Abt) do consider site effects, but they both start with identified projects and external facilitators who served sampled schools. The DESSI study started with a sample of identified innovation sites and then asked who were the facilitators (internal or external).

They were, of course, also interested in many other variables (e.g., climate within a building, availability of resources, characteristics of the particular innovation) that might explain differences in change outcomes.

2. Program Assumptions

Each of the four programs employed a somewhat different set of assumptions.

A fundamental assumption of the National Diffusion Network (NDN) is found in its emphasis on the use of person-intensive change tactics. A second assumption is that innovative programs, developed in schools by school people, that have been carefully evaluated in terms of quality, educational significance, and potential transportability, can serve as attractive and potent models for innovation adoption in other schools. A third assumption pertains to the fundamental nature of diffusion and the adoption of innovations. NDN views school change as a process occurring over a series of stages; hence emphasis has been placed on development of appropriate materials and tactics by change agents to support the change process at different stages. A fourth assumption of NDN is that two types of change agents are needed: State Facilitators and Developers/Demonstrators. Facilitators act as brokers and process specialists, who may assist in identifying potential local education agency (LEA) adopters, and in facilitating the adoption process from initial awareness through program implementation. The Developers function as program or technical experts who promote their own programs and assist clients in adopting and implementing them.

The state-administered dissemination program (ESEA Title IV-C Adoption/Adaptation Grants) employs a set of assumptions somewhat similar to NDN's, although the primary focus here is on disseminating exemplary innovations developed within one state to potential adopters within the same state. Although these state administered IV-C programs also place some emphasis on interpersonal change tactics, the overall structure tends to be less specialized and systematic than NDN. After a typical three-year development period, successful IV-C project innovators are selected for one or two years of additional funding to perform IV-C Developer/ Demonstrator (D/D) roles. Other LEAs in the state may apply for small Title IV-C adoption/ adaptation grants. Typically, state agency Title IV-C staff play the facilitator role, especially in creating awareness and helping to serve as brokers between IV-C D/D's and adopter sites. In some states, the process approximates a "state-level NDN," but in other states, the human change-support functions are much less developed, and LEA adopter initiative plays a much larger role.

By contrast, the BEH Marketing Program assumes that the essential features of an effective educational practice can be identified and communicated via packaged information and disseminated by educational marketing methods. Consequently, this approach employs an additional set of underlying assumptions. LEA staff are presumed to have the requisite motivation, knowledge, and skills, and will not need external assistance, for identifying needs, selecting appropriate resources, or undertaking the processes of start-up and implementation of a practice.

The local development/invention program (ESEA Title IV-C) assumes that one means of promoting improvement-oriented change in schools is through the provision of "seed money" that would allow LEAs to install new projects that they probably could not undertake without special funds. It is assumed that such external support would be needed only for a limited period (typically no more than three years) while LEA personnel put the new practice into operation and evaluate its effectiveness.* It is further assumed that LEA staff best know their own resources and capabilities and are thus in the best position to decide if a portion of their funds should be used to obtain assistance external to the LEA.

3. Study Methodology

Representing a stratified random sampling of selected programs and innovations in ten states, 146 sites were selected.** Using questionnaires and interviews, the DESSI researchers surveyed teachers (N=366) involved in innovation development and implementation, their principals and superintendents (N=284), a smaller group of central office staff (N=78) who were actively involved in supporting innovations at 65 of the 146 selected sites, and individuals from outside the district (external facilitators) who had been funded to assist in the various improvement efforts (N=96). In addition, a specially designed questionnaire was administered to the total faculty of each school building (N=3129). In addition to the extensive survey data, DESSI also deployed a field team of ethnographers who visited each of 12 schools several times over the course of the 1979-1980 school year in order to develop indepth case studies of selected sites.

4. Key Overall Program Findings***

From the perspective of this synthesis report, perhaps the most important DESSI finding was that the successful transfer of new practice is not just a matter of providing information. Without face-to-face disseminators, implementation does not occur. This point is summarized succinctly by Cox and Havelock (1982). They note that when the DESSI researchers attempted to locate schools that were actually using practices promoted by the BEH Marketing Program, they exhausted their pool of nominated sites (over 200) and found only 17 that were using the practices in any way.

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*Note: The successful local IV-C programs can compete to become the exemplary innovations disseminated by the state-administered IV-C dissemination program or they may become NDN Developer/Demonstrators.

**The 146 schools included elementary school (56%), middle school/junior high school (13%), senior high school (26%), and other (5%) levels. The schools were located in urban (12%), suburban (35%), and rural (53%) areas. Schools ranged in size from 18 to 3,092 students (mean = 611). The sample thus represents substantial geographic, demographic, school level, school size, and urban-rural diversity.

***Final formal reporting of this study has not been completed. Thus, results from the DESSI study are based on review of papers presented at the 1981 and the 1982 AERA annual meetings.

A second major finding was that two fairly independent processes were at work in school improvement efforts. One results in change in classroom practice (the individually-focused model). The other results in organizational change and institutionalization of new classroom practice (the school-focused model). External agents need to be aware that different behaviors influence different processes and produce different outcomes.

When the DESSI researchers looked at the individually focused model, they were initially frustrated because they found no significant differences in outcomes (perceived benefits, change in practice, practice specific mastery, and fidelity of adoption) for various combinations of many predictors. After intensive examination of data on a case by case basis, they speculated that users for whom a new practice represented a *major change* from what they knew and did previously would be involved in fundamentally different change efforts than those for whom an innovation represented only a *minor change* in their instructional procedures. After dividing the sample into these two groups, they discovered two quite distinct patterns.

Minor change. After several iterations of a structural equation model for the minor-change group of teachers, each time removing variables of little consequence, they found a picture of extreme simplicity (Crandall, Bauchner, Loucks, and Schmidt, 1982, p. 8). For example, with *change in practice* as the outcome of interest, they achieved a significant result ($R^2 = .45$, $p < .04$) for a group of 75 "minor-change" users (in 52 sites) with only two predictors, *teacher commitment* and *elapsed time*.* None of the assistance variables (school-level, district-level, external) played important roles in producing the outcome, nor did the time spent on implementation-related activities (e.g., time spent on materials selection/ development, training, evaluation, or communicating with others about the innovation). The passage of time and a sustained personal effort was sufficient to account for differences in changes in practice when only minor changes from previous practice were involved. With respect to external change agents, Crandall (1982) explained, "If the new practice is really not very different from the current practice, the only thing that a disseminator can do is to give teachers information about the new practice and then leave them alone. Disseminators should not invest a lot of time in these sites, because there is no discernable way to enhance the outcome. Indeed, the presence of an outsider rapidly becomes negative."

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* The statistical shorthand ($R^2 = .45$, $p < .04$) indicates that the multiple correlation squared (R^2) equalled .45, i.e., accounted for 45 percent of the total variance in the criterion measure, *change in practice*; and that the probability of a multiple correlation of this size arising due to chance was less than 4 in 100 ($p < .04$).

Major change. The major-change sample (88 teachers and 48 sites) tended to produce more complex predictor to outcome relationships. Perceived benefits appear to result primarily from the change in practice achieved by the teacher, principal help given to teachers, and external assistance ($R^2 = .42$, $p < .01$). Change in teacher practice is enhanced primarily by classroom use of the practice, and secondarily by readiness and local facilitator help, but time spent on materials and external agent help detract from teacher practice change ($R^2 = .49$, $p < .04$). Surprised at the negative influence of external agent help, the DESSI researchers "unbundled" their composite external assistance variable, and then found that a positive contribution by external agents is made by activities directed to particular user's implementation efforts (e.g., planning implementation procedures, assisting teachers in working out procedural details, and providing specific follow up technical assistance.) Practice specific mastery, measured by Levels of Use (Hall, Loucks, Rutherford, and Newlove, 1975) appears to be primarily the product of time spent on materials and time spent on communicating about the practice ($R^2 = .50$, $p < .04$). Finally, fidelity of the new practice to the form stipulated by its developer was the result of teacher time spent on classroom use and principal help, the latter being a direct effect unmediated by teacher time ($R^2 = .53$; $p < .02$).

Since the way teachers spend their time emerged as a matter of central importance in predicting outcomes, the DESSI researchers searched for its antecedents. Only teacher commitment emerged clearly as a primary predictor of both classroom time and evaluation time. Unfortunately, none of the available variables in the individual-level model (assistance at any level, teacher characteristics, or resource availability) significantly explained teacher commitment.* However, the importance of teacher commitment was underscored by its appearance in subsets of the sample. When the local (IV-C) development sites are removed, leaving a pure "dissemination only" sample of 61 teachers (in 35 sites), the teacher change outcome variable is explained almost exclusively by teacher commitment ($R^2 = .65$, $p < .03$). For the NDN sample alone (a sample of 42 teachers and 20 sites) teacher commitment, along with school-level assistance, also yielded a significant teacher change in practice outcomes ($R^2 = .61$, $p < .01$).

School-focused model. Although the main concern of the DESSI researchers lay with understanding the factors affecting classroom-level adoption practice, they recognized that for these practices to have lasting effects, the practice needed to become institutionalized. Three related measures of outcomes were examined: institutionalization, defined as the degree to which the practice became a regular aspect of school life which is not dependent upon present personnel; organizational change, defined as those benefits which affected more than individual teachers or students; and plans for continuation, defined as the likelihood that use of the practice was either eliminated, reduced, maintained, or expanded. In this model, all sites with no missing data were included (N=82), regardless of whether a major or minor change was being attempted. After several iterations of the structural model (using a maximum-likelihood approach), there emerged a relatively complex pattern of relationship depicting two distinct but interrelated patterns of variables. One pattern dealt with teacher or instruction-related variables and the other with organizational variables. The major link between these two patterns was the school principal (principal commitment, principal help, principal management style). However, other actors also emerged as being critical to success.

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*However, in the school-focused model, considered next, teacher control over the practice and local facilitator assistance emerged as significant positive predictors of teacher commitment.

Organizational change and institutionalization. The *external agent's help* was the main predictor of *organizational change*, which in turn was the *only* significant path to *institutionalization.* Indeed the DESSI data indicate that after introducing the new practice, this area seems to be the one where external agents make their most positive contribution to practice improvement. In addition to the crucial role of the external agent in producing this outcome chain (organizational change and then institutionalization), the principal played a central role. *Principal leadership* (defined as the degree to which the principal actively focuses the direction of activity in the school building) was also an important positive predictor of *organizational change*.

The DESSI researchers note:

> These scores [*management style* and *leadership*], based on the judgments of the entire faculty, describe an in-charge professional--one who knows what's happening and is directing it. These schools are not "loosely-coupled."
>
> (Crandall, Bauchner, Loucks, and Schmidt, 1982, p. 20)

The third measure, *plans for continuation*, was significantly related to three predictors: positively to *principal commitment*, positively to *principal leadership*, and negatively to *personal gains* (those benefits reported by users that accrued to them as individuals, versus those associated with student growth). However, *plans for continuation* was *not* significantly associated with organizational change or with institutionalization.

Instruction-related variables. Two subpatterns were found here. In one subpattern we see *principal management style*, *principal commitment*, and *pro-active problem solving* (defined in terms of *faculty* perceptions that effective procedures exist for solving problems and implementing actions) were all direct antecedents of *principal help* (received by teachers), which in turn related (positively, but with borderline significance) to *practice-related mastery* by teachers. Both *school size* and *district size* operated as interesting contextual variables here. *Large districts* were positively associated with greater staff *readiness* to implement the practice, greater *principal commitment* and *principal leadership*, greater *teacher commitment*, and greater user *practice-related* mastery. However, large schools were asociated with lower readiness and lower principal commitment, but greater principal leadership.

As noted previously, external facilitator help primarily affected organizational change and institutionalization. Local facilitator help, which enhanced practice change and perceived benefits in the individually-focused models for teachers implementing major changes, operated in the school-focused model as a significant antecedent to teacher commitment* and to predicting problem alleviation (report by users as to whether the new practice solved problems which they have grappled with for some time).

5. External Facilitators**

The DESSI sample of external facilitators contained 95 respondents from whom they collected data using four different instruments: (1) a questionnaire and (2) an interview, both concerning general aspects of their work as external facilitators; (3) a questionnaire and (4) an interview focusing on assistance given to a particular site. However, only 80 external facilitators provided interview and questionnaire information on 132 cases of assistance to 97 of the 146 sites that were included in the study sample (the number of sites per respondent ranged from 1 to 5 and averaged 1.6 per respondent). Among the 95 external facilitators in the sample, more than half (51) were NDN Developer/Demonstrators. The remainder were nearly evenly divided among: State-Administered IV-C Developer Demonstrators (17), NDN State Facilitators (15), and Locally Developed IV-C Project consultants and trainers (12). Thus, more than two-thirds of the external facilitators (68 out of 95) were in NDN or State IV-C Developer Demonstrator roles, with the remainder nearly evenly split between NDN State Facilitators and local IV-C project consultants and trainers. Programatically, the sample is dominated by NDN respondents (66 of 95).*** Hence, the picture of external facilitators provided by DESSI data was primarily focused on one program, NDN, and on one role, Developer/ Demonstrators. However, because the sample is not totally represented by one program or one role, some variation across programs and roles existed, but unfortunately the other roles (NDN state facilitators or local IV-C consultants or trainers) and other programs (state IV-C; local IV-C) were not represented in proportions that afford very powerful contrasts. The NDN D/D's alone represent over half the sample of external agents (51 of 95).

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*Other significant predictors of teacher commitment besides local facilitator help were teacher control (extent to which teachers believe they control and can influence their implementation effort) and large district size.

**Results described in this section are drawn mainly from Cox and Havelock (1982).

***Nearly the same proportions emerge when total sites with identified external facilitator respondents (N = 97) were classified by program: NDN = 68; state-administered IV-C = 20; and locally developed IV-C projects = 9.

Assumptions of the programs included in the DESSI study were described previously. It may be useful here to present the Cox and Havelock (1982, p. 6) description of these roles:

> Because their primary [NDN] aims have been to spread exemplary practices, they have emphasized extensive services over intensive. While State Facilitators help with arrangements for adoption, and Developer/Demonstrators provide training in the practice and some support, the fitting of the innovation is left largely to the locals. Considerable [NDN] assistance is given away from the actual implementation site, in group training sessions or, in the case of follow-up help, through telephone conversations. The picture of the Title IV-C assisters is more varied . . . some of these consultants worked on a long-term basis with a site through the whole planning/implementation process; others provided components of practice without much involvement in the site; still others worked intermittently through the planning/implementation process, contributing heavily at the evaluation phase."

Cox and Havelock have pointed out that one should not assume that assistance from the external facilitator means help rendered on the site, face-to-face, or continuously. Indeed, out of the 131 cases of assistance, the external agent respondents said they were familiar with the practice at the selected school-building site in only 48 of the cases; in 83 of the 131 cases they said they were not familiar with the practice at the site. However, familiarity varied substantially by role group (and the data present a different overall picture when viewed in terms of agents rather than sites). Perhaps because local IV-C agents were hired by the local IV-C sites, these agents indicated they were familiar with 75 percent of their sites. Next, were the state IV-C agents who stated that they were familiar with 58 percent of their sites. NDN D/D's were familiar with 27 percent of their sites. The NDN State Facilitators, who generally play more of a brokering than a direct implementation assistance role, were familiar with the practice at only 25 percent of their sites.

Categories of facilitator assistance. Cox and Havelock examined data provided by external facilitators concerning their activities with specific sites (30 items grouped into five categories). The sample (N = 88) as a whole spent a little more than half their work time interacting with clients. The remaining time was spent on routine professional tasks (e.g., administration, travel, professional development and inhouse product development). The portion of their time spent with clients was distributed across five (temporally ordered) categories as follows: (1) initiating relationships (e.g., holding awareness conferences, distributing flyers), 25 percent; (2) assisting clients in deciding on new practices (e.g., assessing needs, persuading teachers, seeking support), 16 percent; (3) assisting clients in preparing for adoption (e.g., training users, securing materials), 26 percent; (4) assisting clients in implementing practices (e.g., planning implementation schedules, "putting out fires"), 19 percent; and (5) follow-up activities (e.g., collecting impact data, assisting in local site evaluation), 15 percent. Thus, half their client time was spent on initiating relationships and assisting in adoption preparation. The other half of their client time was spent helping with practice selection, implementation, and follow-up.

Factor analysis of facilitator activities. The 30 activity items had been classified a priori into the five categories named above. However, factor analysis of the 30 items indicated that the empirical organization of the items was a little different. Twenty-seven of the 30 items displayed appreciable loadings on one (or more) of the seven factors displayed in Table 3.*

Table 3. External Facilitator Assistance Factors

- Awareness Initiation: arranging or participating in awareness conferences; distributing general information (e.g., flyers, newsletters); hosting visits to review materials; holding demonstration visits; contacting new clients by mail, telephone, or in person.
- Administrator Adoption Preparation: seeking commitment from school administration; seeking support from local school boards; preparing a "case" for the decision to adopt; working with administrators; allocating financial resources.
- Support of Teachers: seeking commitment; building support among school personnel; maintaining support among school personnel.
- Teacher Adoption Preparation: arranging training; training the users; providing detailed information; securing materials or other required resources.
- Implementation Specifics: planning implementation schedules; providing technical assistance or follow-up training; assisting teachers in working out procedural details.
- Evaluation: collecting impact data; analyzing impact data; assisting local site to conduct evaluation of new practice.
- Continuation/Diffusion: developing plan to support continuation; developing additional new users at site.

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*Three assistance items did not have high factor loadings on any of the seven factors. These items were: "making library and computer searches for materials" (one of the least often performed and least "important" of the activities as rated by the respondents); "fighting fires" (which was rated "most disliked" by a large portion of the sample); and "assessing needs".

Differences in activities among types of external facilitators. Using the seven factors as a basis for calculating mean scores for each role group, Cox and Havelock reported the perhaps not unsurprising finding that the five role groups did display some differences on adjusted factor score means for frequency of performance. Over all five groups (unweighted averages of rankings of the seven factors within each group), Teacher Adoption Preparation tended to be the highest ranking (most frequently performed) set of activities, followed by Awareness Initiation, Implementation Specifics, Support of Teachers, Administrator Adoption Preparation, Evaluation, and then Continuation/Diffusion. When factor scale means were examined across the five role groups, two of the seven sets of means displayed statistically significant differences: Awareness Initiation ($p < .001$) and Teacher Adoption Preparation ($p < .015$). Awareness and Teacher Adoption Preparation activities were among the most frequently performed activities, ranking either highest or next highest among the seven factor score means for all role groups, except the local Title IV-C facilitators. The local Title IV-C facilitators were much less often engaged in Awareness Initiation activities (ranked as least frequently performed of all seven factors) and relatively less often engaged in Teacher Adoption Preparation (however, in this case, it still was the third most frequently performed type of activity). If local Title IV-C facilitators tended to place relatively less emphasis than the other four role groups on Awareness Initiation and Teacher Adoption Preparation, where was their emphasis placed? On providing Implementation Specific assistance (most frequently performed) and on providing Evaluation assistance (next most frequently performed). It should be recalled that facilitators involved in local Title IV-C projects were often called in by the site project well after the adoption/implementation process had begun and often to perform relatively specific assistance tasks. Differences among the other four role groups appeared to be minimal.*

Impact of External Facilitator assistance on school improvement. We have previously reviewed the Crandall et al (1982) findings based on the construction and test of two causal models (individual-focused and school-focused). Cox and Havelock reviewed these models with special attention on the external facilitator. The school-focused model displayed the clearest evidence of positive impact of the external facilitator. Here External Facilitator Help had a significant positive effect on Organizational Change, defined as those benefits (reported by principals) that had impact on aspects of school life other than individual teachers or students. In order of frequency of mention, these included: instructional methods, staff socio-emotional state, materials, planning/scheduling, organizing, staff communication, increased number of staff, and assessment. In this school-focused model, Organizational Change is the only variable that had a significant effect on Institutionalization. Cox and Havelock provide additional information demonstrating that the benefits, as reported by principals, matched fairly closely the types of required changes as reported by external facilitators.

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* Unfortunately, Cox and Havelock did not report means and standard deviations, only rankings of means. Hence, secondary analysis of their reported data does not permit a sensitive test. However, we note that the rankings (across the seven factor means) were highly similar for the other four groups (no more than one rank difference among the four groups on six of the seven factors and only a two rank difference among the four groups on the seventh factor (Implementation Specifics). Although Cox and Havelock did not draw this conclusion, their reported data suggest all four of their "pure" disseminator role groups (i.e., NDN-SFs; NDN-D/Ds; Title I D/Ds; and State-Administered D/Ds) were remarkably similar in their relative emphases of assistance roles, whereas their local Title IV-C group (N=12) was indeed very different in its pattern of activities.

When the individually-focused model was examined for evidence of external facilitator impact, two different pictures emerged, depending on whether one looked on the "large change" or "small change" teachers. External facilitator had litle impact on the small change group, except that, in a secondary analysis, the assistance measure, Teacher Adoption Preparation, was positively related to the time spent by teachers in training.

The results for the most-change group are more complicated and troubling. In the primary analysis, the DESSI researchers found that External Facilitator Help had a significant negative impact on Change in Practice. However, several secondary analyses that unbundled the External Facilitator Help measure indicated that some aspects of the facilitator help were positive though others were negative. It appeared that two of the seven External Facilitator Assistance Factors (see Table 3), Implementation Specifics and Continuation/Diffusion, were the only external assistance measures that directly or indirectly had a positive, significant impact on individually-focused outcome measures. Both these factors included items that dealt with fitting or maintaining a practice in its new environment, e.g., planning implementation schedules, providing technical assistance or follow-up training, assisting teachers in working out procedural details, developing plans to support continuation, and developing additional new users at the site. It thus appears that the more assistance given to teachers in working through the processes of the practice in its local context, the more impact external facilitators are likely to have. Cox and Havelock cited a companion DESSI report by Huberman and Miles (1982). After an exhaustive review of all assistance, both internal and external, given to the 12 sites included in the DESSI ethnographic study, Huberman and Miles concluded that assistance made more of an impact in local sites seeking to implement large-scale innovations. High assistance, involving both external and local facilitators, that was sustained through later implementation, had the following outcomes: stabilization of practice, increasing cohesiveness/trust, reduction of isolation, building an implementation "team" and building an assistance infrastructure, coordination and collaboration. Huberman and Miles note that "the message here is that a high assistance presence moves its client systems away from loose coupling as a way of life."*

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*Huberman and Miles, 1982, p. 152; quoted in Cox and Havelock, 1982, p. 21.

C. Linking R&D with Schools: The Study of the NIE Research and Development Utilization Program

1. Program Description

In June of 1976, the National Institute of Education established the Research and Development Utilization (RDU) Program as an experimental effort to combine R&D-based products with rational problem-solving methods to help schools clarify and solve local problems. The RDU Program was designed to achieve three objectives:

- to help schools identify and find ways to solve specific, locally-defined problems in the areas of basic skills and career education;
- to help school and community personnel learn about the products of educational research and development; and
- to increase understanding of how the local program improvement process could be better managed and become more effective.

The RDU Program was unusual among federally-funded dissemination strategies because of its very heavy and dual emphasis on dissemination and use of R&D products and on development of local organizational capabilities to apply systematic problem identification and solution processes. The NIE program was also unusual in terms of its explicitly experimental nature. Although the NIE solicited proposals from and funded projects in agencies that appeared capable not only of implementing the generic RDU program design, but also of institutionalizing the program, RDU was explicitly designed as an experiment to test a series of assumptions about R&D utilization.

The RDU Program's orientation was action research. About 77 percent of the effort supported seven operational projects providing direct services to schools, whereas about 23 percent of the effort was directed to the study of how these services were organized and delivered and their effects in terms of implementation and outcomes at local sites. The service delivery system of the RDU program operated through seven regionally dispersed projects, each of which established and coordinated a network of organizations and individuals. As a whole, the seven projects operated in 20 states and served more than 300 schools or school districts over a three and one-half year period, 1976-1979 (Louis, Rosenblum, Molitar, and others, 1981a).

Many significant commonalities among the seven RDU proejcts were the result of NIE specifications contained in its Request for Proposals (RFP). Specifically, the NIE sought proposals that would:

- attempt to increase knowledge and utilization of R&D outcomes as part of the solution to locally-defined problems,

- attempt to orchestrate a much fuller range of change support services than had characterizxed previous R&D dissemination efforts, and

- attempt to create arrangements among a variety of existing agencies.

The RFP specified that proposals make explicit provision of assistance in:

- delivering technical assistance to local schools through the use of "linking" staff,

- identifying specific educational problems at each school site,

- developing and using information on available R&D-based outcomes (products, programs, practices),

- selecting and adopting specific R&D outcomes based on locally developed criteria and needs, and

- implementing the selected R&D-based programs at the local site.

The RFP also contained specific requirements for establishment of management information systems, documentation, evaluation, and reporting. The funded projects submitted proposals that were responsive to these general specifications. Consequently, there were many ways in which the seven RDU projects were similar to each other (and also remarkably different from virtually all other federally-sponsored educational dissemination efforts). However, the RFP deliberately provided for a diversity of approaches (by inviting proposals that involved various intrastate and interstate organizational arrangements; addressed different subject matter emphases in basic skills and career education; and employed different strategies, tactics, and linkage arrangements among organizations). The following brief descriptions provide an overview of the projects with special emphasis on distinguishing features and characteristics.

The seven RDU projects. The seven RDU projects can be described as natural or field-designed variations of the general RDU design. Four of the projects were located in individual states (FL, GA, MI, PA) and were headquartered in the state education agency. Their prime linkage with schools was through intermediate agencies, although other resource groups, such as university or non-profit service and training agencies, were also part of some project configurations. The other three projects were consortia, each involving schools and intermediate agencies in more than one state.

The Florida Department of Education was the prime contractor in a linkage system that involved the state universities (especially Florida State University and the University of Florida), and eight of the state's Teacher Education Centers (TECs). The intent of this project was to create an infrastructure (legislative, interorganizational, and technical), the Florida Linkage System (FLS), to support a combined effort by the Florida Department of Education, the state universities, and the Teacher Education Centers to assist schools. Developed as an outgrowth of several previous dissemination projects, FLS featured training in group problem-solving techniques that was provided not only to the field agents (one located in each of the eight TECs), but also to selected school staff. School site facilitators, with the help of the field agents, were responsible for leading the staff at their sites through the entire RDU problem-solving process.

The Georgia State Department of Education project aimed to create a permanent state network, consisting of the Department, Cooperative Education Service Agencies (CESAs), and participating school districts, that would be able to generate inner-directed change in schools. The emphasis of the Georgia RDU project was on building local school district capacities in the early stages of planning and program selection, with the implementation phase supported with federal ESEA IV-C funds and state funds. The project also involved a concerted effort to reorient and train Department and CESA consultants as problem-solving "generalists."

The Career Education Dissemination Project of the Michigan Department of Education was designed to develop statewide capacity to implement Michigan's Public Law 97, "Career Education Act," through the creation of a permanent dissemination system in career education. The project employed existing structures and personnel located in the Department in the state's 50 Career Education Planning Districts to channel information and to provide direct training and funds to career education coordinators who were staff members at local sites.

Building on a 15-year Education Quality Assessment Program, the Pennsylvania School Improvement Program of the Pennsylvania Department of Education developed an interorganizational arrangement involving the Department and three experienced R&D agencies -- Research for Better Schools (a regional education laboratory); the Learning Research and Development Center (an educational R&D center at the University of Pittsburgh); and Research and Information Service for Education (RISE, a statewide information and dissmination service) -- to provide R&D services in cooperation with two of the state's Intermediate Units to a number of participating schools. Drawing on the extensive school improvement experience of several agencies, the Pennsylvania project focused on helping sites to form Local Action Teams that then proceeded through a series of defined problem-identification and problem-solving steps.

Whereas the R&DU project antecedents for the four single state projects were all rooted in previous state dissemination and technical assistance efforts and were responsive to state department priorities and state legislative mandates, the following three multi-state projects found their programmatic roots and relationships in pre-existing, nationwide programs (i.e., Right to Read, NEA's Instruction and Professional Development thrust, and the National Diffusion Network). It was through these program networks of shared school improvement ideology and personal relationships that multi-state partnerships were recruited and enlisted.

The Northwest Reading Consortium, with the Washington State Education Agency as prime contractor, operated a consortium of four states: Alaska, Idaho, Oregon and Washington. Built on the national Right to Read (R2R) Program and seen as providing significant refinement of the R2R change

81

strategy, this project took advantage of a history of interstate cooperation in the Northwest in an explicit effort to improve interstate and intrastate communication and dissemination capacity in this region. The Northwest Regional Educational Laboratory was a Consortium affiliate that provided training to project staff and support in the development of a pool of R&D products.

The National Education Association (NEA) operated its project in collaboration with NEA state affiliates and state education agencies in 12 states: Alabama, California, Iowa, Massachusetts, Michigan, Minnesota, Ohio, Pennsylvania, Tennessee, Washington, Wisconsin, and Wyoming. The fundamental premise of the NEA project was that improving teaching strategies and effecting desirable change in the teaching/learning situation, through strengthening instructional and professional development of school staff, would contribute to the amelioration of educational problems in the basic skills. Thus, in contrast to the other RDU projects, the NEA project focused exclusively on the improvement of teacher inservice education. Services were provided by two field agents in each state, one in the SEA and the other in the NEA state organization who trained local staff.

Building on the established expertise and dissemination capability of the NETWORK of Innovative Schools and of the National Diffusion Network (NDN), the NETWORK, Inc., a non-profit organization in Andover, Mass., coordinated a consortium of NDN-affiliated dissemination agencies in six states: California, Connecticut, Kansas, Massachusetts, Minnesota, and Washington. Concentrating on basic reading skills and on the change process itself, the project prescreened many candidate R&D products and change support processes, created a highly selected initial pool of R&D-based resources, and employed experienced NDN field agents to provide assistance to local schools.

When compared to the four single state projects, the three multistate projects tended to centralize significantly larger portions of support operations (e.g., information services, training, evaluation) at project headquarters. However, there were major differences. The NETWORK was the most concentrated and self-sufficient, NEA was intermediate, and the Northwest Reading Consortium (the one state education agency prime contractor) was the closest to its single-state SEA project cousins in its tendency to subcontract all or part of its information, training, and evaluation support functions.

Conceptually and operationally, each of the seven projects confronted accomplishment of change on at least three levels: (1) change in the classroom behavior of individual teachers, (2) change in the organization of schools and their staff as problem-solving entities, and (3) change in intraorganizational and interorganizational relationships, including development of support systems and reorientation and training of personnel to assume new or improved linking agent and linking suport roles. Though the single-state projects were concerned with developing organizational systems that could cope with the intra- and interorganizational realities of several levels of educational bureaucracies within a state, the multistate projects confronted the special problems of maintaining extremely dispersed organizations that depended primarily on the knowledge, skills,

82

and motivations of field agents who had to work far more independently. Because of the greater geographic distances and looser organizational ties, the multi-state projects all placed substantial emphasis on recruitment and socialization of field agents who would be committed to the project's rationale and approach and who could operate effectively without close supervision or direct support.

Despite major differences in structure and dispersion among the projects, they shared a number of common features, including: (1) the operation of a project office that coordinated the provision of services, (2) the development and servicing of a knowledge base composed of R&D products and change-process support materials, (3) the development of training and technical assistance components to serve the field agents and/or school staff; and (4) the conduct of project documentation and evaluation activities to provide formative evaluation information to project particpants, to facilitate local self-evaluation by participating school sites, and to document project activities and accomplishments.

2. Program Assumptions

NIE's assumptions, which were to a large extent reflected in the individual projects, involved a set of generic assumptions concerning: (1) the conditions believed to control change, (2) the use of appropriate tactics and strategies to support school improvement-oriented change, (3) the organizational linkages external to the local school necessary to provide school improvement services, and (4) the nature of anticipated outcomes (Hutchins, 1976). These assumptions were:

1) Conditions Required for Change

Certain conditions were hypothesized to be necessary and sufficient to support change that leads to improvements in educational practice. (From a research perspective, these conditions represent the "independent" or "antecedent" variables of the design.) They are:

- Reasons for change. Reasons for change must have been generated; whether externally- or internally-generated, these reasons for change must be internalized within the organization in order for change to occur, and all these reasons must be transformed into incentives for the individuals involved.

- Knowledge on the part of all who must be involved in the change. There must be a knowledge of the reasons for change, knowledge of alternatives to the status quo, knowledge or understanding of the nature of the innovation selected for implementation, and reasonable knowledge or expectations about the consequences of the change.

- An innovation. A clearly-defined, different way of doing things must be selected that matches local needs and constraints (the innovation can be generated from within the adopting site or adopted from outside). If actual improvements are to result from the changes, this innovation must have the demonstrated capability of producing the desired improvement--increases in learning. (In the RDU Program, this ancillary condition is handled either through "front end" quality control--encouraging the selection of R&D outcomes with proven effectiveness--or "tail end" provisions for site-specific evaluations of the effectiveness of the change effort.)

- An organizational environment that supports the change process. The organization must provide leadership and absence of threat to those who seek change, and a management and technological capacity equivalent to that required by the targeted innovation. (Included in the latter requirement would be an ability to define goals, identify appropriate roles and divisions of labor, gather and use appropriate feedback about the early use of the innovation, and deliver needed support services.)

- Material resources. Those, if any, required to acquire the necessary elements of the innovation.

- Human resources. In sufficient number, with sufficient skills, along with available time and energy to carry out the design of the innovation.

- A plan of and formal commitment to what is to be done. This should be developed by and endorsed by those involved in the change.

- Sufficient time for the change to be implemented and for the outcomes to be observed.

- An opportunity or triggering mechanism. Something must provide impetus to put the process in motion. (It could be an event such as the failure of a school bond issue, the hiring of a new superintendent, or an event tied to a regular, planned renewal process such as a scheduled review of materials for replacing existing texts.)

2) Tactics and Strategies for Change Support

(From a research perspective, these tactics for mitigating unfavorable conditions constitute one of two sets of "intervening," or manipulated variables.) In the presence of all the conditions listed above, it was hypothesized that change will occur. In the absence of such conditions, it can be said that there is a discrepancy between the conditions necessary for change and those that exist. When discrepancies exist, an agent (an individual, an organization, a "system" of organizations) can undertake to provide services and/or stimulate internal capacities to correct the deficiency. When applied from outside the school, these services constitute a set of "tactics" or support services. For example, a variety of information tactics can be deployed when knowledge is deficient. Training or the use of consultants can be arranged when human resources are inadequate. Financial resources can be supplied when funds are deficient. Innovations can be made available or modified when none is available from within. These tactics can, in turn, be combined and implemented in a pattern of tactics (i.e., a strategy).

3) Organizational Linkages Necessary to Provide the Required Services (These constitute the other set of intervening variables.) The program hypothesized that when internal capacity is insufficient to supply needed services, the involvement of one or more external organizations (or individuals) may be required to implement the activities/tactics/strategies necessary to mitigate deficient conditions. One agency, such as an intermediate service agency, might not have the necessary capacity and resources to deliver all the required services. Hence, linkages or arrangements among several agencies may be needed to provide necessary resources and to implement the required tactics.

4) Program Outcomes
(These constitute the dependent variables.)

The outcomes that are predicted when the above necessary and sufficient conditions prevail are as follows:

- A mitigation or amelioration of unfavorable conditions for change, which, in turn, will result in . . .
- A change or changes in the educational program (school management, classroom instruction, etc.) which, in turn, will contribute to . . .
- Improvement in the performance, achievement, or growth of school-age children or adult learners.

These outcomes define the long-term objectives of the projects. It is also possible to identify shorter-term objectives which, under certain investigative circumstances, also constitute dependent variables. These are related to the four areas in which the RFP called for services:

- Improved identification of local needs;
- Increased sophistication in establishing criteria for selection of innovative programs;
- Increased use of information about R&D-based innovations; and
- Increased utilization of R&D outcomes.

In summary, the paradign of assumptions of the R&D Utilization Program is contained within the following statement:

> Certain conditions are presumed necessary and sufficient for change; when one or all are missing or unsatisfactory, there are thought to be tactics that can be delivered as services to improve conditions for change; the services can be obtained from within the organization or through external linkages with other organizations. When these services result in sufficiently improved conditions, change and improvement will occur.

It should be emphasized that this description is idealized. The elements described do not necessarily have a one-to-one correspondence with the specific assumptions of the seven field-initiated projects, but they do tend to define the common set of program assumptions shared by the seven RDU projects.

3. Study Methodology

Because evaluation components were specified in the RFP, each project completed various self-evaluations of its own activities. Further, under the leadership of the NIE and with evaluation technical assistance provided by the Far West Laboratory, the seven projects developed a common set of documentation instruments and a shared case study methodology that were used by the projects to document their own findings and accomplishments, including the eventual production of 42 case studies. Early interim RDU findings across the seven projects were reported in Blackwell, Hood, and Pool (1978) and in Louis, Molitar, Spencer, and Yin (1979). Beginning in November 1977, Abt Associates, Inc., a social science research firm based in Cambridge, Mass., initiated a three-and one-half-year, indepth study of the RDU program that addressed six major issues:

- how relationships are managed among various agencies which have the expertise and resources to help local schools solve problems;
- to what degree an intervention program such as RDU can help schools overcome barriers to successful problem solving (such as limited access to information or lack of planning skills);
- to what degree the products of educational R&D are relevant to the problems and contexts of local schools;
- what is the impact of the products of educational R&D once they have been adopted and implemented;
- what factors contribute to the institutionalization of the RDU approach within a variety of organizations; and

- how field agents coordinate the flow of external resources to schools, and whether this practice helps schools solve problems.

Early in their study of the RDU program, Abt researchers conducted a series of familiarization visits to nine participating schools. Through unstructured interviews, the researchers learned that, in general, awareness and utilization of new educational products were being increased through the use of improved problem-solving practices. It was also apparent that, as a direct result of participation in the program, the schools themselves as well as the school personnel were changing in a variety of ways. This early finding led to a decision to expand the range of outcomes to be studied to include an array of unintended organizational and personal impacts going beyond the original NIE and project assumptions. The methodological approach employed by the Abt researchers merged qualitative and quantitative data within as well as across sites; employed persistent attempts to triangulate data sources and interpretations; and involved cyclical interaction between the qualitative and quantitative method during all phases of the study, including sampling, instrumentation, data collection, and analysis.

Data sources included: data collected by each of the seven RDU projects, including the 42-site specific and relatively unstandardized case studies produced by case study writers employed by the seven RDU projects; early cross-site data on sites and linking agent activity that had been organized by the Far West Laboratory and the NIE; a mailed survey in Fall 1979 with completed returns from 594 teachers (48% response rate) and 152 principals (76% response rate) from a sample of most of the schools that had not officially "dropped out" of the program;* and field notes and site reports based on visits by Abt researchers to 51 RDU schools (nine were visited during the orientation phase; 42 additional schools were visited in Fall 1978 and Winter 1979, and half of the 42 schools were revisited in Fall 1979.) In addition to these major data sources, there were a variety of other sources, including data on the seven projects and on the field agencies and agents that served each of the school sites, "event-triggered" reports submitted to the NIE describing the different phases of each school site's progress, a case study writer's survey (which provided some standardized data on almost all the case study sites), and various other documents provided by the projects, the sites, or other individuals.

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*In five of the projects, questionnaires were sent to the universe of principals whose schools had been in the project for at least two years. Due to the number of schools involved in the Michigan and Georgia projects schools were sampled. In the case of teachers, each RDU project provided a list of "potential users" for each sampled school. If there were fewer than five teachers, all were included in the sample. If there were more than five, five teachers were randomly selected.

The methods used to merge qualitative and quantitative data sources are described in Louis, Rosenblum, and Molitar (1981) and in Louis (1982). They involved a complex process that permitted the Abt research staff, as a group, to arrive at a consensus that produced a reliable, holistic, cross-site "consolidated coding" scheme integrating features of both the qualitative and the quantitative data available in variable amounts across the sites. Consolidated Coding Forms (CCFs) were prepared for 90 schools. (As many as 179 RDU project schools were represented with teacher survey data, but only 55 schools are represented by principal, teacher, and Consolidated Coding Form data sources.)

4. Key Overall Program Findings

The Abt researchers reworked the NIE hypotheses (see Assumptions section above) based on additional literature reviews and preliminary data collection to produce the schema outlined in Figure 4.

In terms of the schema depicted in Figure 4, the RDU intervention employed three interrelated strategies to produce school improvement outcomes. These are (1) provision of R&D-based products, (2) provision of external technical assistance, and (3) stimulation and support for school staff to undertake an internal problem-solving process. External technical assistance is seen as influencing internal problem solving, which, in turn, leads to the selection of appropriate R&D-based products, which are then implemented by the local school. Finally, (4) local conditions, including site and problem characteristics, are seen as also affecting the problem-solving process. All four types of variables: (1) products, (2) technical assistance, (3) problem-solving process, and (4) local conditions are seen as affecting proximate and distal outcomes. We shall use this schema to review some of the key overall findings of the Linking R&D with Schools Study.*

As in the DESSI study, the Abt researchers also examined outcomes at the individual and the school level.

Individual outcomes. The data for these findings are based on analysis of survey responses from individual teachers and principals, as well as data on the 90 CCF sites, that examined four categories of knowledge utilization and school improvement: R&D product outcomes, problem-solving process outcomes, outcomes for the school organization as perceived by individual teachers, and personal benefits for teachers.

R&D product outcomes. Among the schools that had reached the "product selection" stage by the time of final data collection, more than 80 percent of the teachers responding to the survey indicated that they had used or were using the selected products, and another five percent had definite plans to begin use in the future. Fewer than 20 percent of the users reported that

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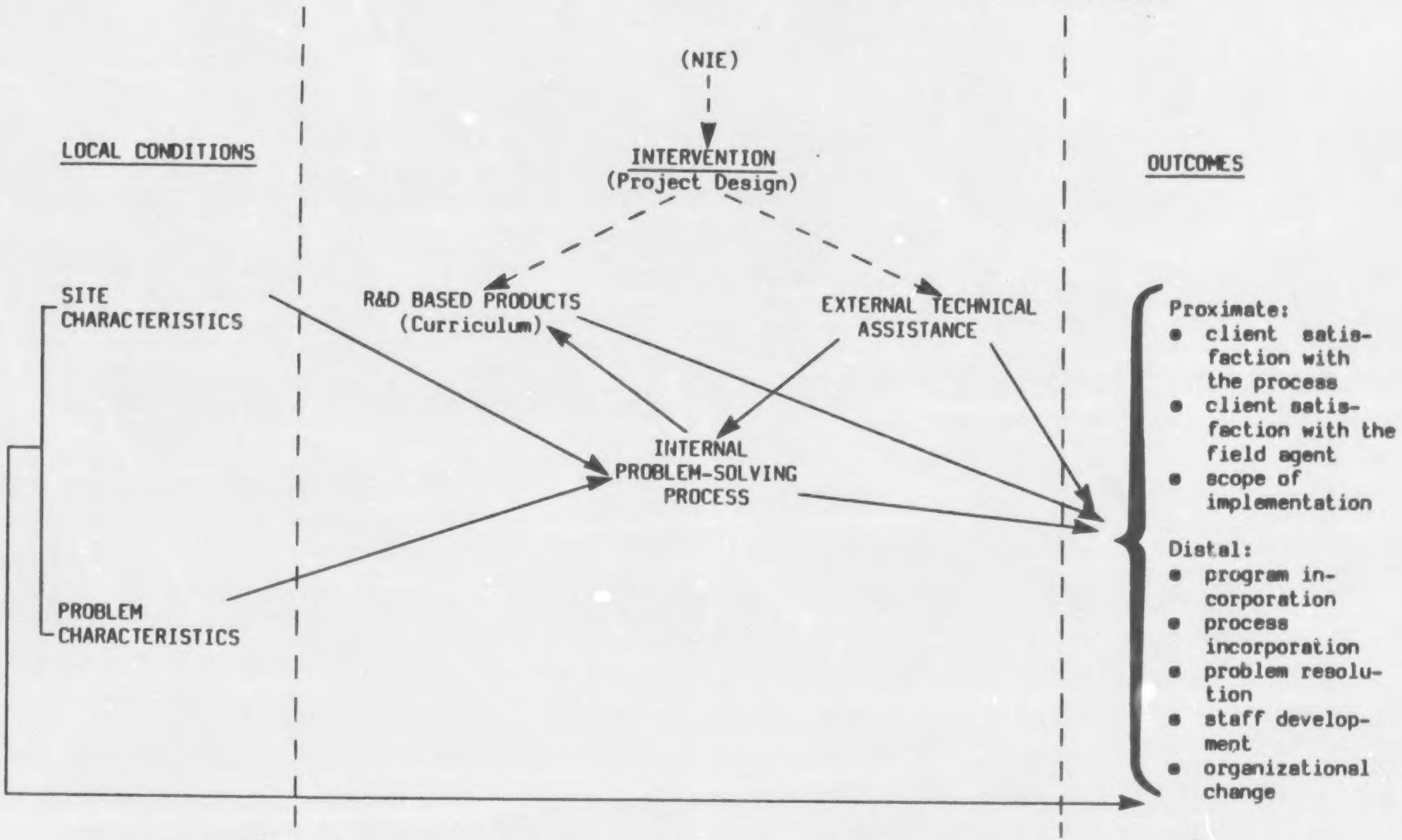
*This summary is based primarily on Louis and Rosenblum (April 1981) and Louis, Rosenblum, and Molitar (July 1981a, July 1981b). Note that the Abt study findings are far more extensive than those summarized here. Please see Bibliography at the end of this report.

Figure 4.

A SCHEMA FOR EXAMINING THE IMPACT OF KNOWLEDGE UTILIZATION ON LOCAL SCHOOLS*


(NIE)
LOCAL CONDITIONS
INTERVENTION
(Project Design)
OUTCOMES
SITE CHARACTERISTICS
R&D BASED PRODUCTS (Curriculum)
EXTERNAL TECHNICAL ASSISTANCE
INTERNAL PROBLEM-SOLVING PROCESS
PROBLEM CHARACTERISTICS
Proximate:
• client satisfaction with the process
• client satisfaction with the field agent
• scope of implementation
Distal:
• program incorporation
• process incorporation
• problem resolution
• staff development
• organizational change

*Lines and arrows represent hypothesized relationships
dotted lines and arrows represent hypothesized relationships ~~which are~~ discussed in reports of the RDU study (Corwin, 1980; Louis and Rosenblum, 1981).

the products selected needed adaptation to a great or very great extent. Product use was high: More than 65 percent of those using the products reported they used them with all their students, and 85 percent stated the product was regularly used at least once a week. Satisfaction with the adopted products was generally high, with more than half of the users reporting that the products were directly relevant to the most pressing problems in their schools. Only about nine percent of the users reported great or very great difficulties in implementing the program or materials they had selected. Fully 83 percent of the users reported they would continue to use the materials. In terms of longer term implementation, principals in more than 70 percent of the schools said that the products had been or would be incorporated into curriculum plans. More than 90 percent of the principals reported that some or all of their teachers would use the products to some extent, and 62 percent said that the products would be used extensively.

Problem-solving process outcomes. The RDU strategy called for broad-based participation in a rational problem-solving process at each site. At 92 percent of the 90 sites for which highly detailed (CCF) data were available, problem-solving teams were formed, with generally good representation on the teams. From a detailed examination of the extent to which each site followed an "ideal" rational problem-solving process, it would appear that most of the sites adhered closely, but not completely, to the principles of sound problem solving.

Outcomes for the school organization as perceived by individual teachers. The majority of the teachers--between 50 and 70 percent--reported that there were positive effects on their schools on a number of dimensions: improved curriculum, better materials available, enhanced collegiality among staff, better teaching. About 45 percent of the teachers said the image of their school in the community had improved, and about 40 percent reported an improvement in school organization and management, improved decision-making and problem-solving procedures, and improved morale. Although about 30 to 50 percent of the teachers reported "no change" on any one of these dimensions, generally fewer than two percent said any of these dimensions had been adversely affected.

Personal benefits for teachers. An anonymous questionnaire was used to ask participating teachers about personal benefits. Between 15 and 30 percent of the teachers reported that they had benefited "to a great extent" or "to a very great extent" in the following ways: Their teaching and leadership skills had improved; they had learned about curriculum development; they had more self-confidence; and they had new resources for helping their colleagues. Another 30 to 40 percent of the teachers reported these benefits "to some extent."

School-level outcomes. The results reviewed in the previous sections were largely based on raw data from individual teachers and individual principals as the units of analysis. In the following sections the results are presented, with the school as an organization as the unit of analysis. To reduce the number of variables to a manageable set, summary scales were developed for each school from data in the consolidated coding forms (CCF), the survey of principals, and aggregated teacher survey data.*

Most of the school-level analyses involved correlational and multiple regression analyses in which various sets of predictor variables were regressed on a set of six outcome measures: (1) *organizational impacts*, a global measure of impact on the school, including improvements (as a result of RDU participation) in curriculum, materials, school organization, staff morale, etc.; (2) *product incorporation*, a measure of the extent to which product use continues after implementation; (3) *problem-solving process incorporation*, such as reported re-use of all or part of the activities and procedures which the RDU process involved; (4) *problem solved*, the extent to which principals and teachers reported the problem had been solved through the use of adopted materials, including improvements in pupil performance, attitudes, and behavior; (5) *scope of implementation*, which refered to the proportion of pupils in the school who are exposed to the adopted product and the proportion of their school day affected by its use; and (6) *personal impacts*, a global measure of personal impacts, including increased knowledge about curriculum development, increased self confidence, improved teaching skills, etc.** Examination of the table of correlations for these measures indicated that four of them--scope of implementation, problem solved, incorporation of R&D product, and organizational impacts--were all moderately highly intercorrelated, with correlations ranging from .46 to .60. In contrast, the correlations involving personal impacts with the other five outcome measures ranged from .21 to .49; and those involving process incorporation ranged from .21 to .39. Although somewhat correlated, each of the six outcomes represented a conceptually different outcome that displayed somewhat different patterns of relations to the RDU intervention components and with the local site conditions. In terms of the schema depicted in Figure 4, here are some study results for school-level outcomes.

Outcomes for R&D based products. Approximately 100 different products or sets of curricular materials were adopted by participating schools. In general, products ranged from lists of objectives for teachers to detailed management programs. The products themselves varied along a number of dimensions that were related to various outcomes.

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*Again a reminder that the Abt reports contain much more information on school-level outcomes than is summarized here.

**Two additional process outcomes were also considered: (7) site satisfaction with the activities of the field agent (to be considered in a later section), and (8) site satisfaction with the problem-solving process. With two exceptions, both involving satisfaction with the field agent, all the 28 correlations among these eight outcome measures were significant (N = 180 schools), with correlations ranging from .11 to .60 and a median correlation of .30. The two satisfaction measures were significantly correlated, r = .42, but the correlations with the other six measures ranged from .11 to .27 for satisfaction with the field agent and from .27 to .43 for satisfaction with the problem-solving process.

Product quality, which reflected the degree to which teachers and principals rated the products as relevant, applicable in their situation, and providing a genuinely new way of doing things, was particularly important in predicting the degree to which the particular local *problem was solved* (Beta coefficient, B = .58),* the level of *product incorporation* (B = .24), and *personal impacts* (e.g., staff development benefits) reported by teachers (B = .36).** The *complexity* of the product was important in predicting overall *organizational impacts* (B = .31), *product incorporation* (B = .29), *personal impacts* (B = .21), *difficulty of implementation* (B = .31), and the overall *organizational impacts* (B = .28). Multiple correlations (involving only those product characteristic variables that increased the multiple R^2 by 1% or more) produced R^2 values that ranged between .33 and .51 for five of the six outcomes. Only *process incorporation* was not well predicted by product characteristics (*product validation* was the only characteristic with a significant Beta, .35, with this outcome).

The many significant, and moderately sizeable R^2, values indicated that product characteristics were significantly more important than most current implementation theories allow. Good products not only create student impacts and organizational change, but also have significant personal impact (e.g., staff development) spinoffs. Local materials development and adaptation, rather than facilitating implementation and institutionalization (as suggested by the earlier RAND "Change Agent" studies) showed slight, but consistently negative, relationships with outcomes (e.g., -.27 correlation between *new materials development* and *scope of implementation*). Louis and Rosenblum (April 1981, p. 6) drew this conclusion:

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*Most of the Abt study findings for school level outcomes were reported in terms of standardized stepwise regression (Beta) coefficients with predictor variables regressed, with an unforced order of entry, against each of the six measures of school outcomes. Beta coefficients are reported only for those variables that contributed to the multiple correlation squared (R^2) by one percent (1%) or more. To simplify reporting, only statistically significant Beta coefficients (B) will be reported here, with $p \leq .05$, unless otherwise noted. Note also, B is *not* the unstandardized regression coefficient. We have used the symbol B, rather than β, for typing convenience.

**Note that most of the products actually adopted were practitioner-developed and validated (i.e., NDN products) rather than formally developed R&D-based materials such as those found in the NIE Catalogue. Of 194 product adoptions reported by Spring 1979, only 19 (10%) were selected from the NIE Catalogue, whereas 47 (24%) were selected from the NDN Catalogue. A total of 74 (38%) products, including locally validated products, were assumed to have been validated, whereas 120 (62%) were not known to have been validated. The characteristic of the adopted product having been validated (i.e., "objective" quality) was a significant predictor only of the *process incorporation* outcome, and a nonsignificant, but incremental, predictor of the *scope of implementation*. However, "subjective" *product quality*, as perceived by adopters, was a relatively powerful predictor of the three outcomes as noted above.

> This implies, we believe, based on our site visit data, that externally developed products can be implemented with only slight tinkering *if* the school has carefully defined what it is that they need, and has gone through a systematic process to find a product that will not only fit the problem but the local context. It is not necessary to recreate the wheel in each district in order to obtain high levels of school improvement.

The impact of external technical assistance. Two kinds of external technical assistance were provided to schools by most of the projects: the services of a "linking agent," facilitator, or other problem-solving *generalist* who was employed by the RDU project to support the school in its activities over the entire problem-solving process and *specialized training* which was typically intended to aid the school staff in implementing the chosen R&D product. Eight external technical assistance variables were correlated with six school outcome measures for a sample of 76 schools. Among the 48 possible Beta coefficients, 13 were statistically significant ($p < .05$). These significant relationships indicated that technical assistance and training activities had substantial impacts on *scope of implementation*, *organizational change*, and *product incorporation*, where multiple correlations explained 46 percent, 40 percent, and 43 percent of the respective variances. However, three outcomes--*problem solved* ($R^2 = .21$), problem-solving *process incorporation* ($R^2 = .21$), and *personal impacts* ($R^2 = .19$)--were *much* less impacted. Three technical assistance variables--one related to training and two related to linking agent behavior--appeared to be the most powerful predictors of impacts. The *amounts of training* received by site staff prior to implementation and after implementation had significant effects on *organizational impacts* (B = .33), degree to which *problem was solved* (B = .24), *scope of implementation* (B = .28), and *personal impacts* (B = .26). The *diversity of training sources* also had significant impacts on *organizational impacts* (B = .25), *product incorporation* (B = .43), problem-solving *process incorporation* (B = .22), degree to which the *problem was solved* (B = .31), and *personal impacts* (B = .21). The time that the linking agent spent with local site committees or problem-solving teams, *linking agent time on site*, was predictive of the degree of *product incorporation* (B = .23) and *scope of implementation* (B = .31). Both the quantitative and the qualitative data suggested that the two types of external technical assistance have different impacts on the site. On the one hand, field agents (generalists) appeared to have their greatest impacts in stimulating the school to define its problems more broadly and to think more ambitiously about what it might do to solve them, thus producing a change program at the site of greater scope with better chances for effective product incorporation. The specialized training provided by consultants, on the other hand, had broader impacts within the school, affecting not only product incorporation and scope of implementation, but also problem-solving process incorporation, degree to which the problem is solved, and production of both personal impacts and broader organizational changes.

The impact of internal problem-solving activities. The RDU approach was unusual among federally sponsored dissemination activities in its stress on the need to provide each participating site with assistance in problem solving at each of a series of specified stages, including: (1) identification of a problem or a set of problems on which school staff agreed to work; (2) specification of criteria on which staff agreed to judge the characteristics of potential solutions; (3) examination of alternative solutions to the problem, focusing particularly on the products of educational R&D or on validated practitioner-developed products; (4) selection of a specific solution considered to be appropriate to the problem; (5) planning for implementation; (6) implementation of the solution; (7) evaluation of process and outcomes; and (8) incorporation of both the solution and the problem-solving process. In addition to this rational problem-solving process, broad-based participation among those who might be affected by the process was also stressed. All the RDU projects attempted, in varying degrees and with different approaches, to guide sites through this generic problem-solving approach.* Although projects could exert less direct influence or control over this part of the RDU intervention strategy (as compared with project influence over the R&D-based or validated products that were made available or the type of external technical assistance that was provided), the local problem-solving process was considered to be an essential feature of each project's effort.

The Abt data show that among the 90 sites for which highly detailed data were available, problem-solving teams, with generally good representation, were established at 92 percent of the sites. Interest and attendance were high in most sites, and few members dropped out. However, the Abt researchers found that, during the early stages, decisions were often made or were heavily influenced by administrators or other external parties. This effect occurred at 36 percent of sites during problem identification, and at 24 percent of the sites during solution selection. And during later implementation stages, meetings and formal decision making were less regular in 20 percent or more of the sites. The adherence to the principles of sound decision making was surprisingly high, yet far from perfect. For example, 80 percent of the sites carried out problem-identification procedures according to plan, and during solution selection, 80 percent or more of the sites selected a new and pertinant solution that was acceptable to both the staff and the administrators.

However, more than 40 percent of the sites showed one, sometimes several, departures from "ideal" problem-solving criteria established by the Abt researchers. For example, during problem identification, 46 percent of the sites provided a problem definition that was merely a restatement of someone's prior assumption or pet theory; in 34 percent of the cases the problem was not adequately specified before the search for solutions was undertaken; and in 44 percent of the cases, alternative solutions were not examined in terms of a set of explicit criteria. During implementation, adherence to sound practice was generally much closer, with only about a quarter of the sites showing any deviations. Perhaps most surprising, the Abt researchers found that 41 percent of the principals and 34 percent of the teachers at participating schools said they had repeated or were repeating all or part of the process with another problem in their school. Frequently repeated parts of the approach included: use of teams of teachers and administrators to make decisions, enlisting the services of an external field agent, and using procedures for deciding among alternative solutions.

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*The RDU program was especially remarkable in its emphasis on the "predecision" stages, i.e., problem identification, solution criteria definition, solution search, and solution selection.

In the Abt quantitative analysis eight problem-solving process variables were measured: (1) level of effort, (2) overall quality of the problem-solving process, (3) faculty influence on the process, (4) principal influence, (5) superintendent influence, (6) other central office staff influence, (7) breadth of involvement in solution selection, and (8) breadth of involvement in implementation. Among the 48 regression coefficients involving these eight process predictors and six measures of school outcomes were 11 statistically significant coefficients. However, the multiple correlations were substantially lower than those found using R&D product variables or external technical asistance variables as predictors.

Among the six school outcome measures, only organizational impacts ($R^2 = .38$) was predicted with a multiple R^2 above .20. Much of the predictive power of the internal problem-solving process on school outcomes resided in the two measures of breadth of involvement (during solution selection and during implementation) and in the measure of overall faculty influence over the decision-making process. (However, none of the Beta coefficients for these predictors exceeded .31.)

It should be noted that breadth of involvement in implementation reflected not just the involvement of the faculty and principal within the implementing school, but also the involvement of the superintendent, central office staff, and other relevant actors. A high score typically represented a district in which the central office staff typically took at least some interest in monitoring and supporting the practice and in helping to spread the new practice to other schools in the district. The involvement of the whole faculty in the problem-solving process was often a key element in expanding the sense of ownership beyond the small committee that selected the innovation.

There were two remarkable "negative" findings: The internal problem--solving process did not predict the level of personal impacts reported ($R^2 = .05$) and principal influence was not a significant explanatory factor for any of the six school outcome measures. The Abt site visit data do indicate that, for many of the most successful schools, principals facilitated the problem-solving process stages, but preferred to let the process be teacher-dominated. Though not totally passive, the principals in these schools did not receive the highest scores on influence. This strategy worked, however, only when there were active and able faculty. It should also be noted that the lack of personal impacts (e.g., on level of staff development benefits) represented a measure aggregated at the school level. Measures of benefits for individual members indicated that there were consistently greater personal benefits for those who were on the problem-solving team when compared to those who were not on the team.

The impact of local site conditions. A relatively large number of variables were employed to provide measures in five categories: (1) principal characteristics, (2) teaching staff characteristics, (3) school size, structure, and climate measures, (4) characteristics of the community, and (5) characteristics of the problem that was selected. The results of regressions of outcomes on each of these sets of predictor categories separately had little explanatory power. For principal characteristics and characteristics of the community setting, there were no regressions that explained as much as 15 percent of the variance in any outcome variable. For teacher characteristics, only the percent of staff who were male showed a significant, but negative (!) relation to overall *organizational impacts*.* Three structure and climate variables did explain 15 percent of the variance in overall organizational impacts: *teacher change orientation*, *principal influence over decision making*, and *teacher influence over decision making*. Only one of the five categories of site variable, *characteristics of the problem* (principally that the problem had a focus on classroom organization or on pupil performance) explained as many as three of the six outcomes (these were *organizational impacts*, degree to which the *problem was reported solved*, and *personal impacts*). However, when eight of the most potent of the 31 site variables were combined, relatively high portions of the criterion variance were accounted for, with $R^2 = .50$ for *product incorporation*; $R^2 = .42$ for *organizational impact*, $R^2 = .40$ both for *problem solved* and for *scope of implementation*; $R^2 = .31$ for *process implementation*; and $R^2 = .24$ for *staff development benefits*. Among the eight selected school-site measures, only *school level* and *index of disadvantagement* among students failed to produce significant regression coefficients on any of the six school outcome measures. *Teacher influence* in decision making had significant coefficients in the prediction of both *product incorporation* ($B = .39$) and problem-solving *process incorporation* ($B = .34$), and *teacher change orientation* had significant coefficients in the prediction of overall *organizational impacts* ($B = .52$) and degree to which the *problem was reported solved* ($B = .28$). The percent male teachers had a significant negative coefficient for *organizational impacts* ($B = -.28$).

Prior problem-solving activities added one or more percent to the multiple R^2 for five of the six outcomes, but showed statistically significant regression coefficients for only *product incorporation* ($B = .21$) and *process incorporation* ($B = .29$). These particular results suggest that rational problem solving may have a cumulative effect in terms of school outcome impacts.

The most impressive single school site predictor was that the *problem was concerned with pupil performance*. This predictor had statistically significant coefficients in five of the six multiple regressions on outcomes with the following Betas: *organizational impacts*, .30; *product incorporation*, .47; *process incorporation*, -.31; degree to which *problem was reported solved*, .47; and scope of implementation, .40. Finally, the site characteristic that the problem was concerned with classroom organization had significant Beta coefficients in two regressions: problem solved, .27; and scope of implementation, .39.

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*Louis (personal communication) corrected our first impression that this negative effect probably confounds sex of teachers with level of school, since most male teachers are in secondary rather than elementary schools. Louis noted that the equation included school level. Moreover, a similar finding was reported in the Rural Experimental Schools study (Rosenblum and Louis, 1981).

The combined impact of the three interventions relative to the impact of site characteristics. Table 4 displays squared multiple correlations (R^2) and adjusted squared multiple correlations for each of the three sets of intervention components separately, for the three intervention components combined, for the local site characteristics, and for the combination of all four components. Entries in this table should be compared by rows, across columns. Since the adjusted squared multiple correlations reflect adjustments for sample size and for the number of predictor variables that were included in the particular regression equation, these values may be closer to the value that might be expected if the same predictors were cross-validated on another similar sample of cases. If we compare the adjusted R^2 values by rows, we note, for instance, that the three separate RDU intervention components (Product, representing 11 predictors; External Assistance, representing eight predictors; and Problem-Solving Process, representing eight predictors) each can account for 28 to 36 percent of the variance in predicting organizational impacts; however, when the three components are combined (with four predictors selected from each of the three components) they can account for 55 percent of the organizational impacts variance, and their combined effect is a more powerful predictor than the most potent set of eight site characteristic predictors, which can only account for 40 percent of the variance in the organizational impacts measure. Finally, when strategies and site characteristics are combined--15 predictors--an impressive 68 percent of the variance in the outcome is predicted!

With the exception of one school outcome measure--degree to which the problem was reported solved--the combination of intervention strategies proved a more powerful predictor of school outcomes than any one of the intervention categories. For all six outcomes, the adjusted R^2 for the three combined intervention strategies equaled or exceeded the adjusted R^2 for site characteristics. In other words, the combined power of the RDU intervention components equaled or outweighed local site characteristics in explaining the school outcomes. The Abt researchers note:

> We interpret this as implying that the RDU intervention was particularly effective in equalizing the inequalities in innovativeness among schools that naturally occur as a result of differences in personnel resources, community resources, prior innovative experience. . . .

Finally, the adjusted R_2 values found in the right-hand column indicate that when 15 of the most powerful predictors drawn from all four of the predictor variable sets are combined, explanatory power is increased

Table 4. Percentage of Variance Explained by Three Intervention Strategies and School Characteristics.

Predictor Variable Sets	(1) Product	(2) External Assistance	(3) P-S Process	(1+2+3) Combined Strategies	(4) Site Characteristics	(1+2+3+4) All Four Sets
[N=number of cases]	[N=60]	[N=76]	[see below]	[N=75]	[N=43]	[N=49]
School Outcome Measures						
1. Organizational Impacts			[N=90]			
R^2	.34	.40	.38	.59	.42	.73
Adjusted R^2	.28	.36	.34	.55	.40	.68
2. Product Incorporation			[N=90]			
R^2	.46	.43	.15	.56	.50	.67
Adjusted R^2	.40	.40	.12	.52	.45	.63
3. Process Incorporation			[N=76]			
R^2	.17	.14	.20	.30	.31	.35
Adjusted R^2	.10	.10	.15	.24	.24	.29
4. Degree Problem Solved			[N=76]			
R^2	.51	.21	.15	.43	.40	.59
Adjusted R^2	.46	.17	.11	.41	.34	.53
5. Scope of Implementation			[N=90]			
R^2	.33	.46	.16	.47	.40	.60
Adjusted R^2	.26	.41	.12	.43	.34	.53
6. Personal & Staff Development Benefits			[N=76]			
R^2	.36	.19	.05	.42	.24	.47
Adjusted R^2	.30	.14	.02	.36	.16	.40

substantially in some cases.* More than two-thirds of the total variance is predicted for organizational impacts. Only the process incorporation remains not well predicted, with only 29 percent of the variance explained.**

What did it cost to achieve site outcomes? The financial resources directly available from RDU to local sites were very limited, ranging from $1,000 to $8,000 per site. However, these resources were only a fraction of the actual costs of the innovation process. Based on detailed cost data obtained for 22 sites through intensive examination of records, plus interviews with project participants, Abt researchers estimated that RDU funds accounted for only 20 percent of the local site costs of participation when in-kind costs and when personnel time contributed by school, district, or other sources were included in the site's RDU cost estimates. When total costs (direct plus in-kind) and the percentage of in-kind costs were both correlated with five school outcomes (organizational impacts, incorporation of R&D products, incorporation of problem-solving process, degree to which problem was reported solved, and personal impacts) for this small sample of 22 districts, the results indicate that total costs of the activities at the site level are not significantly correlated (rank order correlation, rho) with any outcome measure (although the trend indicates that the higher the total expenditure the less likely the problem will be reported solved (rho = -.31) and the less will be the personal impacts (rho = -.26). However, the percentage of in-kind costs was a more powerful predictor of organization impacts (rho = .49, p = .02 for N = 22), incorporation of R&D products (rho = .41, p = .06 for N = 22) and personal impacts on teachers (rho = .39, p = .08 for N = 21).

A typology of outcomes. In the previous sections we have summarized the results of a correlational approach that examined the power of various sets of intervention strategy and school site variables to predict school level outcomes. The Abt researchers also undertook a second approach that led to the typing of sites on the basis of similarities and differences among sites in terms of four measures of RDU impact: (1) incorporation of R&D products; (2) incorporation of the problem-solving process, (3) impacts on the school as an organization; and (4) personal impacts on the staff. Sites were asigned to categories on the basis of whether they were "high," "moderate-to-low " or "low" on these four impact measures. The resulting categories were:

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*The 15 predictors included: (1) for product, product quality, difficulty of implementation, product complexity, and product validated; (2) for external assistance, linker/principal contact, linker time on site, amount of training; (3) for Internal P-S Process, degree of faculty involvement, breadth of involvement in solution selection, breadth of involvement in implementation; and (4) for school characteristics, teacher change orientation, principal influence, problem is in pupil performance, problem is in classroom organization, and school index of disadvantagement.

**Since we may assume that none of the six school outcome measures was measured with perfect reliability, the amount of "reliable" variance to be accounted for is less than 100 percent. For example, if the measure of organizational impacts had a true reliability coefficient of .9, its reliable variance would be .81. The remaining .19 would be, by definition, random or error variance. With an R^2 of .68, the four RDU components accounted for .68 of this .81, i.e., for 84 percent of the reliable variance in this outcome measure. However, consider one other note of caution. The regression results reported in the last column of Table 4 used 15 potential predictor variables with entry stopped when additional variables added less than one percent to R^2. With an N of only 49 cases, cross validation results may be much less stable and probably smaller than the adjusted R^2 indicates. This caution also applies to DESSI (Section III.B.4).

- Large-scale RDU success chracterized sites that generally followed the RDU model for problem solving with a great deal of fidelity, implemented an R&D product from their project's knowledge base, and showed unmistakable signs of incorporation of both the product and the problem-solving process, along with such spinoff effects as personal impacts on participating staff and impacts on the school as an organization; (34% of the sample)

- Mixed-high success sites were those that had two high ratings, one being a program goal (either product or process incorporation) and the other a spinoff outcome; (17% of the sample)

- RDU success characterized those schools that had one or two high scores on program goals but none on the two spin-off effects measures; (16% of the sample)

- Spinoffs were those sites that showed some positive effects on the school as an organization and/or personal impacts on participating staff, but did not adhere closely to the problem-solving or product adoption goals of the program to any great extent. Note that, in many cases, schools in this category had their own agendas to begin with--e.g., developing curriculum guidelines--and used the resources of the RDU program to achieve them; (10% of the sample)

- Moderate to low success characterized those schools that had moderate to low ratings on three or four outcome areas and no high ratings at all; (10% of the sample)

- Failure characterized those schools that were very poor achievers on two or more outcome dimensions and that had no high ratings; (13% of the sample).

These overall findings of the Linking R&D with Schools study were succinctly summarized in Louis, Rosenblum, and Molitar (1981, pp. 39-40; this is ED 207 258) as follows:*

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*Additional Abt study data on field agent roles in their organizational context (Louis, Kell, and others, 1981) and on the training and support of linking agents (Spencer, Louis, and others, 1980) will be presented in Chapter IV.

- Dissemination programs create two types of outcomes at the school level: knowledge utilization/implementation and school improvement/capacity building;

- Engaging in a broad knowledge utilization activity is one of the most effective means of building capacity;

- Good products produce good school outcomes: quality control is a critical element of an effective dissemination strategy;

- External technical assistance is important to facilitate both knowledge utilization and school improvement. On the whole, training provided by experts and program developers that related directly to knowledge utilization objectives was more important than generalist field agent support in producing both knowledge utilization and capacity building improvements;

- Field agents (generalists) were important in facilitating improvements in problem-solving behaviors at the school level and in increasing the level of effort and scope of knowledge utilization. However, a high level of involvement by such agents may diminish capacity-building outcomes;

- The quality of the problem-solving process is less important in producing knowledge utilization outcomes than has often been thought. However, it is a key to other school improvement outcomes;

- School characteristics such as the staff's orientation to change and the amount of principal influence are important determinants of how well schools will implement a problem-solving process, but they do not overwhelm the impact of the intervention;

- The biggest payoff in terms of both knowledge utilization and school improvement will be realized by emphasizing the resolution of problems that affect the core activities of the school: teaching and pupils;

- Costly planned change efforts are no more likely to have significant impacts on the school than less expensive ones. However, it is important to allocate a large proportion of the available resources to pay for staff involvement in selecting a solution and planning for implementation. It is also important to supplement external funding with internally contributed staff time and other resources; and

- Though not all schools followed program specifications for a rational problem-solving process and the implementation of an R&D-based, validated "product," the program intervention had almost no significant negative impacts on schools that might offset the generally positive findings presented above.

D. The Research for Better Schools Local School Improvement Study

1. Program Description

In 1978 the Field Studies Component of Research for Better Schools (RBS) initiated a three-year study of the provision of external assistance for school improvement provided by three other units at RBS.

2. Program Assumptions

Three RBS program components had developed similar curriculum planning approaches in three areas: basic skills, career preparation, and citizenship education. These approaches assumed that the use of specific curriculum planning and problem-solving procedures and materials by linking agents could help schools to identify and correct weaknesses in their instructional programs. Each approach employed similar steps: (1) identification of an initial direction through goal setting or through selecting variables that have a critical impact on the content area, (2) collecting data on performance relevant to the selected goals or variables, (3) data analysis, and (4) innovation design. The three units varied somewhat in the extent to which these steps were formally codified.

Additional assumptions made by the RBS units included: (1) that the research base in the content field (basic skills, career preparation, citizenship education) could be applied to improve instruction,* (2) that change could be produced through the use of rational problem-solving strategies that emphasized development of clear goals and making decisions based on adequate information, (3) that linkers who employed both a problem-solving "process helper" and a technology of instruction approach in specific content areas would be more effective than if either approach were used exclusively, (4) that successful change efforts require a local sense of project ownership, and (5) that change at the local site is best accomplished if linkers work with a Local Planning Team (LPT), consisting of several teachers, the school principal, and sometimes other key participants that would assume the responsibility for following the steps of the approach and for making decisions in the local change effort. These assumptions are not very different from those of the RDU Program.**

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* In career and citizenship education, RBS derived knowledge about good practice from descriptions of programs developed by schools throughout the country. In basic skills the knowledge base consisted largely of research on student time-on-task in relation to achievement in reading and what experience suggested could affect time-on-task.

** The reader may recall that RBS was one of the agencies in the Pennsylvania School Improvement Program, one of the NIE-sponsored RDU projects. Since RBS participation in the Pennsylvania RDU took place circa 1976-1979, early experience with RDU undoubtedly influenced the RBS Local School Improvement Study design. However, RBS had been engaged in many other school improvement and instructional planning and management R&D efforts dating back to the late 1960s. Hence, earlier RBS experience also undoubtedly influenced the Pennsylvania RDU design.

A final assumption, again like RDU, was that the approaches themselves should be subject to development and evaluation. As the research progressed it became apparent that the RBS approach made considerable demands on school resources (e.g., planning time, staff expertise, clerical services).

3. Study Methodology

The three RBS units sought volunteer schools to work with them in developing their approaches. After negotiations with several districts, 11 teams were formed in 13 schools (one team included three schools). There was substantial diversity among the selected schools. Four were elementary schools, six were junior high schools, and three were high schools. Enrollments ranged from 375 to over 3,000. Two schools were in major cities, three were in suburbs, four were in small cities, and four were in rural areas. Many of the selected schools had substantial educational problems (e.g., principals in five schools estimated that 60 percent or more of their students were at least a year behind in reading and math).

The Local School Improvement Study was based primarily on intensive field work in five schools with more limited data collection in the other eight schools that had agreed to work with RBS field agents. Six agents worked in five schools. Each agent had an advanced degree in education, teaching experience in public schools, and previous involvement in implementing curriculum programs in the field. During the school year, the RBS field agents averaged more than two visits a month to their schools, and, in addition numerous phone calls were made between RBS and the sites. Finally, there were summer project-related workshops at three of the sites. Data were collected through extensive observation and interviewing of field agents and school staff. For more than two years, RBS Field Studies research staff accompanied agents on their visits to sites. During these visits the observations and comments of participants were recorded in field notes. In addition, there were periodic formal and informal interviews as well as observation in schools when the field agents were not present. The extensive set of field notes were analyzed to identify and code variables of interest.

4. Key Overall Findings*

1. The linkers' contribution to the school change process was modest. The study did not identify linker activities that uniformly promoted educational change. Indeed, successful field agent behavior in one site was not necessarily appropriate for another site. Linkers seemed to react to events as much as they provided direction. These adjustments in the

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*Based on Firestone and Corbett (1981), and Corbett (1981). Additional information, especially concerning the organization of the schools and the RBS relationship, is available in Firestone and Corbett (1979), Firestone and Herriott (1980), and Corbett, Davison, and Firestone (1982). The last document was not available at the time this review was prepared.

ways linkers actually provided assistance were often necessitated by the characteristics of the schools' contexts, especially the availability of resources, the frequency of administrative turnover, and the extent of school staff conflict. Linkers were helpful precisely because they could adjust and thereby act as mediators between RBS and the school site. This skill in keeping the two agencies working together constructively and linkers' skills in mediating differences among individuals or groups within the school site were perhaps their most useful roles.

2. School factors had a substantial impact on the change process. The support of district staff and the belief of team members that their efforts would help solve a locally recognized problem were the major facilitators of change. Change was implemented most widely in schools where administrators offered early, enthusiastic endorsements for the change projects, followed by their active support and involvement throughout subsequent change activities. The relationships between degree of central office support and progress through the RBS component's steps, and the relation between central office support and the local team's sense of ownership were both strong and positive. However, some kinds of school organizational structures were amenable to one kind of change but not another. For example, loose organizational structuring facilitated individual changes but constrained the extent to which schoolwide changes were possible. School staff relationships and motivation were also important. School staff sometimes disagreed about the nature of the problem or the appropriate means for solving the problem. Moreover, school staff frequently reinterpreted and evaluated the usefulness of technical knowledge provided by field agents, the resource materials, and the data gathering activities in the light of their personal experience. The levels of problem-solving motivation of principals and teachers were not always the same. In four teams where the principal's and teachers' motivations differed, the team's sense of ownership was low and the teams made either poor or only fair progress through the RBS steps. The relation between level of teacher problem-solving motivation and the team's progress through the RBS component's steps, and between teacher motivation and the team's sense of ownership, were both positive and substantial. Overall, the relationship between the principal's motivation and progress or sense of ownership and progress were much weaker than for teachers.

School impacts on linking agent roles.* RBS assigned three technical functions to the field agents : (1) to assist program improvement by bringing to the schools knowledge about successful educational practices and the process of change through goal identification and rational problem-solving, (2) to help local staff develop the capability to direct the change process themselves, and (3) to provide feedback to RBS's development specialists on needed revisions in the process. Agents at all sites performed these three technical functions. However, the agents found it necessary to supplement their technical role with several additional functions in order to keep the schools moving through the change process. Corbett (1981) identified five additional functions: (4) expanding process helping, (5) process adjusting, (6) endorsement seeking, (7) mediating, and (8) providing clerical services.

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* Based entirely on Corbett (1981). See Corbett, Dawson and Firestone (1982) for an extensive discussion of this topic.

Expanding process-helping. Originally, the RBS agents anticipated that they would need to provide special technical assistance to a few individuals to enable these individuals to guide the change process themselves. The agents expected to model certain techniques for guiding the process but expected school staff gradually to assume responsibility for planning team sessions and delivering most of the technical knowledge to the rest of the participants. Thus, the agents hoped to reduce their active involvement over time. Generally, this did not happen. School staff had their normal responsibilities and only limited time to spend on the project. Most RBS agents were forced to assume "director" or "coordinator" roles in order to maintain project progress. Only at one site did a successful transfer of project leadership to site staff occur.

Process adjusting. RBS considered its approach to curriculum change to be in a developmental stage; consequently agents were expected to provide feedback that would assist RBS developers in refining the approaches. At the same time, agents made subtle on-the-spot adjustments in the approach at individual sites. Typically, agents were required to compromise some technical aspect of the RBS approach in return for continued school participation.

Endorsement-seeking. RBS agents not only needed to obtain the approval of school district and building administrators when they began the project, but found themselves having to re-enter negotiations periodically, primarily due to turnover of personnel in key administrative positions.

Mediating. At several sites, the agent would be forced to intervene between teachers and administrators or risk the loss of the project. Agents often found themselves serving as neutral parties, receiving complaints about school practices and serving as spokespersons to mediate disagreements.

Providing clerical services. In order to avoid delays in moving to subsequent planning steps, and to accomplish the sometimes heavy load of clerical work associated with the RBS planning process, agents sometimes obtained or provided clerical services for the planning team.

Although the RBS approach had defined the expectations for the agent technical functions, four aspects of the school context were the primary factors that affected these additional agent roles: (a) school resources, (b) interpersonal relations, (c) organizational stability, and (d) school staff expectations.

Resources. The RBS approach required time of administrators to plan and participate in meetings, time of teachers to attend meetings and carry out projects, expertise of individuals to guide the team through the planning process, and clerical assistance to complete projects and prepare reports. Scarcity of any of these resources could hinder or delay the planning process. To cope with resource scarcity, agents had to expand their process helping role, had to adjust the planning process to fit local conditions, and sometimes had to provide clerical assistance.

Interpersonal tensions. Because the RBS local planning team included both teachers and administrators, interpersonal relations between school units or between administrators and teachers sometimes became a major problem that required agents to play a mediating role.

Organizational instability. Severe student discipline problems, last-minute meetings, and unannounced visits by parents, also forced agents to expand their process helping roles, since administrators were frequently pulled away from planning meetings. The agents discovered that they could not rely on administrators for directing project activities. Turnover in administrative personnel also meant that agents periodically had to seek renewed endorsement for the project.

Staff expectations. Once the agent responded to any of these conditions (resource scarcity, interpersonal tensions, organizational instability) by performing any of the additional functions (e.g., expanding process helping, process adjusting, mediating, providing clerical services), site staff usually expected the agent to retain that function as a regular part of the interaction with the site team. In general, school staff pressed for agents to remain active participants who could perform a wide variety of roles that not only provided technical expertise but compensated for problems due to resource scarcity, interpersonal tensions, and organizational instability.

E. The RBS Study of Regional Educational Service Agencies

In 1980 and 1981 the RBS researchers considerably expanded the scope of their study of linking agents to examine the school improvement roles played by educational service agencies in New Jersey and Pennsylvania.

1. Program Description

In December 1979, RBS began a study of three educational service agency (ESA) systems in Pennsylvania and New Jersey. The systems were:

- The 29 Intermediate Units (IUs) of Pennsylvania. These intermediate units provide special education, inservice training, curriculum development assistance, and a variety of managerial services to schools.

- The 21 County Offices (COs) of New Jersey. These agencies monitor compliance with state education regulations and provide assistance concerning legal and administrative matters.

- The four Educational Improvement Centers (EICs) of New Jersey. The EICs provide a variety of training and technical assistance services primarily in curriculum and instructional areas.

2. Program Assumptions

Because this was a study of field agents in agencies rather than in programs, we must look at state policies. The state of New Jersey has been explicit in separating monitoring from other assistance tasks. After a series of judicial decisions in 1975 the New Jersey legislature enacted legislation that made the state department responsible for ensuring that each school system provide a Thorough and Efficient (T&E) Education to every child in the district. The New Jersey T&E legislation requires that school districts follow a state mandated planning process and that schools achieve above minimum criterion levels on a state-designed basic skills test. Should districts not meet these requirements, the state can take over operation of the district. State department planners saw two functions to be performed in the field: (1) monitoring to insure compliance and (2) training to increase the districts' capacity to educate, especially in those areas specified by the T&E law. The decision was made to separate these two functions. Monitoring procedures were to be developed by the department, and the New Jersey County Offices were assigned the task of implementing these monitoring procedures. The training function was assigned to the New Jersey EICs.

The average New Jersey County Office has seven professionals, six of whom work in the field by visiting schools to monitor compliance, respond to requests for information, and oversee state career education, vocational education, and special education programs. (The RBS study included data on 56 field agents located in 10 of the 21 New Jersey County Offices.)

The four New Jersey Education Improvement Centers (EICs) were formed between 1967 and 1975 to specialize in providing technical assistance to schools. Their mission is to "on request . . . provide support and assistance to local school districts and to members of teaching and administrative staff through the delivery of materials, techniques, and expertise necessary to improve school programs and services." EIC staff size flucuates because these agencies rely heavily on competitive federal and state funding. In 1980, the average EIC had approximately 60 staff, half of whom performed field agent roles by offering workshops, providing technical assistance, and operating small resource centers/libraries. (The RBS study included data on 22 field agents located in two of the four New Jersey EICs.)

Pennsylvania's 29 Intermediate Units (IUs) were formed in 1970 when the state's county offices were reorganized after a major program of school district consolidation. Although more than 80 percent of IU budgets in the 1970s were allocated to the operation of special education programs, the IUs provide a number of other services required by the state (e.g., curriculum development and planning services, inservice education for teacher certification) and they may offer any other services agreed to by a majority of the school boards in the region served. The average IU has a staff of more than 200 persons, most providing special education services; however, most IUs have from one to twelve persons who provide inservice training programs, operate continuing education programs, serve as consultants in curriculum development, and coordinate contacts between school districts in the region and various state and federal agencies. Because the IUs administer special education funds, they do have some monitoring responsibilities in this area, but the IUs are primarily service-oriented agencies that are closer to the New Jersey EICs than the New Jersey County Offices in their orientation. Most of the program of each IU is determined by a board of directors elected from the boards of education of member districts. (The RBS study includes data on 60 field agents located in 11 intermediate units.)

3. Study Methodology

The RBS study of ESAs was designed to provide information on the operation of intermediate level agencies operating in the RBS service region. The study was designed to answer questions such as: How are ESAs organized to help schools use knowledge? What are the activities of the field staff of these agencies? How do field agent activities contribute to local school knowledge use? How do schools view and use the services of ESAs? How does the environment of ESAs affect their operations?

Data were collected in two waves. In the fall of 1980, site visits were made to 23 ESAs (11 IUs in Pennsylvania, 2 EICs and 10 COs in New Jersey). Interviews and questionnaires were administered to 138 field agents (all the field agents in 17 of the ESAs, and more than half the agents in 6 ESAs). Interviews were also conducted with 41 ESA administrators and with 36 external informants (e.g., superintendents of schools, ESA board members).

In the spring of 1981, site visits were made to 72 school districts. In each district the person most familiar with the district's working relationship was interviewed. Questionnaire data (N=537) were also obtained from teachers, principals, and central office administrators.

Three sets of analyses were planned: (1) an analysis of ESA field agents, (2) an examination of LEA use of knowledge and services, and (3) an examination of ESA operations and interactions with its environment. The following findings are based on RBS analyses of field agent data completed in 1981 and 1982 (Firestone and Wilson, 1981a; 1981b; 1982a, 1982b).

4. Key Findings

Perhaps the primary contribution of the RBS study of Pennsylvania and New Jersey ESAs is the contrast it provides between assistance and enforcement roles played by ESA field agents. Unlike the other studies considered in this synthesis, i.e., the State Capacity Building Grants Program, the National Diffusion Network, ESEA Title IV-C, The Research and Development Utilizational Program or RBS's own Local School Improvement Study --- the RBS ESA study provides a view of another type of change strategy; namely, enforcement of federal and state education laws and regulations. Among the 133 ESA field agents who provided sufficient data to be included in the analysis, 43 percent, including virtually all the 56 agents from the ten New Jersey County Offices, mentioned monitoring as an important part of their work. The survey administered to the field staff included a question asking to what extent each agent played 11 different roles. One role item, "Monitor who identifies discrepancies between regulations and practices," proved to be unrelated to the other ten items (forming its own single item factor in a factor analysis) but was highly discriminating in terms of the type of ESA the field agent was associated with. Firestone and Wilson (1982a, p. 33) present data which show that when the individual scores for this item were aggregated to obtain a mean agency score ranging from 0 to 4 (0 = "not at all" to 4 = "a very great extent"), all ten of the New Jersey County Offices means were between 3 and 4, as were two of the 11 Pennsylvania Intermediate Units. However, all the remaining ESA means (including the two New Jersey EICs and nine of the 11 pennsylvania Intermediate Units) were between 0 and 2. With the exception of two Pennsylvania Intermediate Units, it appears that the three types of ESA could be classified on the basis of this one "monitoring" item as belonging to one of two types of agencies: (a) regulatory agencies or (b) non-regulatory service agencies. Firestone and Wilson, January 1982, p. 33 present only a scattegram of agency means; however, Firestone and Wilson, June 1982, p. 27 report the means by agencies. On the five-point scale (0 = not at all; 4 = a very great extent) the mean for 22 agents in two New Jersey EICs is 0.67. The mean for 60 agents in 11 Pennsylvania Intermediate Units is 1.52. However, the mean for 56 agents in ten New Jersey County Offices is 3.61. The F-test for an analysis or variance test of the differences among these means is highly significant ($P < .001$).

The second most powerful discrimination among types of ESAs was made on the basis of a "scale" consisting of two field agent role items:

- "Expert on a curriculum area"
- "Workshop presenter" [trainer]

Perhaps not surprising is the finding that means on this two item "Expert/Trainer" scale were exactly the reverse order of those for monitoring. Here EICs score the highest (2.90), the IUs are intermediate (2.41) and the County Offices are lowest (2.04). Again, there is a statistically significant difference among means ($P < .01$). In terms of individual agency means for this "Expert/Trainer" scale, only two of the 11 IUs appear to have means that are (only slightly) higher than the two EICs. The two EICs are conspicuous at the high end of this scale. Moreover, there is only a small overlap between the distributions of scores of the Pennsylvania Intermediate Units and the New Jersey County Offices. Only two County Offices means are higher than the median for the 23 ESAs, whereas only two Intermediate Units are below the median. Hence, the RBS study indicates that the type of ESA agency can powerfully affect some of the roles played by field agents, specifically their monitoring roles and their training role.*

A factor analysis of the 11 role descriptor items (an orthogonol principal axis factor analysis with varimax rotation) is reported with three factors (see Table 5). The set of items is too small to provide reliable scales for three factors, especially the last.** However, the RBS in-depth interviews are used to provide greater depth of interpretation to each of the three factor scales.

Table 5.

Factor Analysis of Eleven Field Agent Roles (N = 138)

ROLE ITEMS	FACTOR 1 Expert/Trainer	FACTOR 2 Liaison	FACTOR 3 Monitor	h^2
Curriculum Expert	.78	.15	-.05	.63
Curriculum Designer	.64	.28	.30	.58
Workshop Presenter	.62	.10	.43	.58
Group Process Trainer	.50	.35	.14	.39
Resource Finder	.08	.65	.08	.44
Needs assessor/Planner	.15	.59	.15	.39
Coordinator	.21	.54	-.14	.36
Monitor	-.09	-.03	-.67	.45
On-Call Consultant	.22	.40	.15	.23
Proposal Writer	.41	.19	.45	.41
Salesperson	.32	.21	.14	.17
Eigenvalue	2.05	1.54	1.04	
Percent Common Variance	44%	33%	22%	

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*It should be also noted that no statistically significant difference was found among types of agencies on a third scale consisting of three "liaison" items.

** Four items display loadings of .5 or higher on the first factor. Three items display loadings of .5 or higher on a second factor. The remaining four items apparently each formed their own factor. However, for some unexplained reason, factoring was stopped and rotated after three factors had been extracted, thus producing a third factor with appreciable loading on only one item, "monitoring."

The first factor is Expert/Trainer. It consists of four items. However, because two of these items, curriculum designer and group process trainer, were the least frequently mentioned of the 11 items, the Expert/Trainer scale used in subsequent analyses was the sum of responses to only two of the four items with high loadings on this factor:

- "Expert on a curriculum area"
- "Workshop presenter"

Firestone and Wilson (June, 1982, pp. 10-14) quote from two interviews with persons who scored high on this dimension of their work:

> I am a specialist in bilingual education and English as a Second Language . . . I work with or assist any district, community agency or college. The range is from early childhood education to universities. . . . I use two main strategies: workshops that are held at the (agency) or in the district or community and consultations [at] the agency or on site. [EIC agent]
>
> I assist the local education agencies in any area of reading from preschool to adult. I meet with core committees on Title IV-C projects, help in implementation of the Pennsylvania Comprehensive Reading Program. . . . I do inservice, consulting, grant proposals, workshops, and testing. [IU agent]

The second factor, labeled Liaison, includes three items:

- Resource finder
- Needs assessor/planner
- Coordinator

The interviews with persons scoring high on these three items suggest that liaison work includes both technical and political linkage. Some of this liaison activity is for the purpose of determining needs.

> I have three [advisory committees]. One is related to bilingual and English as a Second Language. The other one's related to career education and the other one is related to science education. And those are forums for . . . creating demands for services. And that's a two-way street. Hearing needs and addressing those needs with the services we provide. . . . You have to be a better listener. You have to prod people to share with each other. [IU agent]

Another aspect of liaison is arranging for services:

> My major responsibility is . . . trying to match the need identified in local school districts with expertise in our own agency or a local university. I coordinate a continuing education program similar to that of a college. [IU agent]

In addition to arranging for services, liaison agents also mediate between districts and regulatory agencies, as indicated in these two interview excerpts:

> I inform the board and the superintendents of forthcoming legislation and its effects on their policies and programs. Also I get an audience for a particular superintendent or board president with legislators regarding unique district problems. [IU agent]

> We stand between state policies and interpret them. We have to soften these policies and assist the districts. Sometimes this involves handholding. [IU agent]

The final factor, unfortunately, is represented by only one item:

- "Monitor who identifies discrepancies between regulations and practices."

Fortunately, the RBS interview data on persons who rated this item as one done to a very great extent provided further information on this role. The interviews indicated that monitors found that enforcing the laws and regulations required a good deal of negotiating and explaining. In some cases, this required giving very specific direction:

> [Regarding] coordinating basic skills and special service programs. The individual [in the district] assumed the coordinator's role for special services, but didn't work at doing it. . . . We finally said, you must have a coordinator or the program won't be funded. They got a new coordinator. [CO agent]

However, monitors often found strict enforcement was not possible:

> You can't hold it over their heads. You can't say "It's the law." We show them alternative ways to do things. [CO agent]

In many cases, monitors deemphasized enforcement and portrayed themselves as working with school districts to help them cope with regulations:

> I try to help districts be in compliance with federal and state mandates. I assist school districts in identifying their roles to organize and be able to see where they are in the T&E process. [CO Agent]

Comparison of the three roles. To further explore the functions associated with each role type, RBS researchers conducted an indepth examination of their data and identified six key facets of field agent work where differences were likely to occur amomg the three role types. Thirty-two indicators were developed, based on both the survey and the interview data. The six facets were:

1. the content areas in which field agents worked,
2. the specific activities they carried out,
3. the intensity of their relationship with their clients,
4. the initiators of ESA activities for school districts,
5. the sources of knowledge agents used, and
6. the strategies agents employed to deliver services.

Table 6 shows the results for the 12 variables where statistical differences (based on Analysis of Variance or Chi Separate tests) exist among the groups of individuals who scored high (top third of the score distribution) on only one of the roles and low (bottom two thirds of the distribution) on the other two. These individuals were considered to be representatives of "pure-types" of each of the three field agent roles.

Content. With respect to the content area facet, the three "pure-types" displayed quite different patterns. Curriculum content was primarily the province of Expert/Trainer agents and administrative content was the special concern of Liaison agents. Although legal content was mentioned by more than 60 percent of all 133 agents [see Overall Score column], it was mentioned by only 29 percent of the 17 "pure" Expert/Trainers.

Activities. Almost two-thirds of all agents mentioned conducting workshops as one of their work activities. However, the three pure types displayed a roughly evenly-spaced descending order of mention, Expert/Trainers mentioning workshops most frequently (88%), then Liaison Agents (69%), and finally Monitors (44%). Roughly the same pattern, but with a greater discrepancy between types, was found for writing activities: Expert/Trainer (76%), Liaison (31%) and Monitors (0% !). Perhaps the greatest surprise was that only 81 percent of the "pure" Monitors mentioned monitoring as a work activity! The other small surprise here was that pure Liaison agents mentioned monitoring less frequently (8%) than pure Expert/Trainers (24%).

Intensity. Only one item showed a significant difference on this facet. Monitors engaged in far fewer long-term projects (2.3 per year) than either Expert/Trainers (10.7 per year) or Liaison agents (9.2).

Initiation. In the questionnaire, field agents were asked who initiated the interaction: the district, the ESA, or the state? It appeared that, overall, more than half the initiation was by the districts. The state initiated more ESA activity for Monitors (located primarily in New Jersey County offices) whereas the ESA itself was more frequently the initiator for Liaison agents or Expert/Trainer agents, who are typically located in EICs or IUs.

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* A personal sources factor scale, containing three items identifying types of persons as sources of knowledge, did not show statistically significant differences among the three pure types of agents and thus is not included in the table.

Table 6

Selected Differences Among Pure-Type Field Agent Roles

CHARACTERISTIC	OVERALL SCORE* (N = 133)	PURE-TYPE SCORES Expert/ Trainer (N = 17)	Liaison (N = 13)	Monitor (N = 19)
Content Areas (% who mention):				
a. Curriculum	57	76	38	31
b. Administration	29	29	77	0
c. Legal	61	29	77	88
Activities (% who mention):				
d. Conducting Workshops	66	88	69	44
e. Writing	32	76	31	0
f. Monitoring	43	24	8	81
Intensity (# per year)				
g. Number of Long-Term Projects	6.7	10.7	9.2	2.3
Initiation (% of time initiated by):				
h. Educ. Service Agency	35	31	41	26
i. State Educ. Agency	19	13	10	38
Knowledge Sources (scale score**):				
j. Paper	2.76	3.10	2.76	2.14
k. Institutional	1.95	2.05	2.15	1.45
Strategies (% who mention):				
l. Expertise	19	59	15	19

* The overall score included field agents who were in mixed, as well as pure-type categories. There were five respondents who did not report sufficient data to be included in this analysis.

** The scales represent the average of the items that a factor analysis indicated cohere as a set. The metric runs from 0 = never to 4 = weekly.

Knowledge sources. Two of three factor scores (based on a factor analysis of 18 knowledge sources items) showed significant differences among agent types.* The overall scores in Table 6 (items j and k) indicate that field agents turned to paper sources (newsletters, educational journals, curriculum materials, text books, and technical reports) more frequently than they turned to institutional sources (state department of education, federal agencies, professional associations, regional advisory committees). As might be expected, given their marked differences in writing activities, Experts/ Trainers turned to paper sources more often than did Monitors. Both Experts/ Trainers and Liaison types turn more frequently to institutional sources than did Monitors.

Strategies. Among the particular strategies agents mentioned that they employed in creating an interest on the part of school districts for ESA services, only one--exhibiting an expertise in an activity or content area--showed a statistical difference among pure role types. This strategy was used almost exclusively by Experts/Trainers.

Role Combinations. Table 7 displays the distribution of Field Agents by role type.

More on enforcement and monitoring. Table 6 shows that monitoring was mentioned by 43 percent of the total sample of 133 agents but rarely by pure Liaison type agent (8%) and only occasionally by pure Experts/ Trainers types (24%). Moreover, Table 6 indicates that all three of the types involving high monitoring constituted only 42 individuals (31 percent of the 133 agent sample). Since 41% of the total sample came from New Jersey County offices where monitoring was the predominant field agent activity, we conclude that with the exception of two Pennsylvania IUs, nearly all the RBS data on "monitor" agents has been drawn from the New Jersey County offices. Much of Firestone and Wilson (January 1982) deals with description of these New Jersey County Office monitoring or enforcement roles. Firestone and Wilson noted that the New Jersey County offices "represent one of the largest systems for [educational] enforcement purposes in the country." Before the T&E law was passed in 1975, the 21 County Offices were staffed by 56 professionals. By 1978 this number had nearly tripled to 155 professionals, all with some formal responsibility to monitor compliance with state and federal legislation. With 573 public school districts in the state, there are only approximately four districts per County Office professional staff member. However, the County Offices have a broad monitoring mandate including T&E compliance, tenured teacher evaluation regulations, budgeting procedures, building codes, and federal laws. All 2,411 schools in the state are to be visited annually. The RBS interview data indicated that many agents downplayed or redefined their work as an assistance activity.

> The primary thought in our work is not to act as a monitoring agent. I don't do checklist monitoring. I feel more like a TA [technical assistance] person. I help districts identify needs.

In the internal kind of work we do here, we try to provide service kinds of activities to local districts in terms of helping them to meet all of the state and federal requirements for all the kinds of school programs that they offer.

A lot of my time (one-half to two-thirds) is spent on the phone answering field questions. The rest of my time is spent doing policy clarification and giving solutions to problems in meeting state guidelines and mandates for special education.

Table 7.

Distribution of Field Agents By Activity Type*

ACIVITY TYPE	NUMBER	PERCENT
Monitor only	19	14%
Trainer only	17	13
Liaison only	13	10
Monitor-Trainer	7	5
Monitor-Liaison	15	11
Trainer-Liaison	22	17
Monitor-Trainer-Liaison	1	1
None	39	29
TOTAL	133	100

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* Field agents were classified into none, one, two, or all three of the activity types if they scored in the top third of the particular activity score distribution.

Firestone and Wilson suggest that there were two reasons for enforcement staff to deny or down play their monitoring and enforcement roles. First, nearly all of the county office staff are drawn from the population they monitor. Most (83%) had previous work experience in education as teachers or administrators, and more than two-thirds of those who scored high in the monitoring area reported that they received their highest degree from an institution within commuting distance of the region they now serve. Second, the New Jersey Department of Education lacks the political power to monitor aggressively even if field agents wanted to. This is evidenced by the legislature's threat in 1978 to cut the budget line for county offices by $1 million and by charges by both candidates for governor in 1981 that the system for monitoring was wasteful, expensive, and in need of change.

Given the interest of these field agents in changing their monitoring roles and also recent outside criticism, Firestone and Wilson looked again at the 32 dimensions on which they had compared all three pure types (see Table 6). This time they compared pure monitors (N = 19) with only pure trainers (N = 17) and monitor-trainers (N = 7). In a second comparison they compared pure monitors (N = 19) with pure liaison agents (N = 13) and monitor-liaison agent (N = 15).* Most of the differences between the pure types have already been presented in Table 6. However, when only the pure trainers and the pure monitors are compared, the two types also differed significantly on the percent of time spent on long-term projects (21.5% for pure trainers vs. 11.6% for pure monitors, with monitor-trainers at 18.2%). Pure trainers also spent significantly more time with teachers (42%) than did pure monitors (21%), and again trainer-monitors were intermediate (30%). School districts were more frequently the initiators of contacts for pure trainers (47% of all contacts) than for pure monitors (30%). However, in this case trainer/monitors had even a lower percent of school district initiations of contacts (26%).** Finally, in addition, earlier difference found in the use of expertise as a strategy, there was a statistically significant difference between pure trainers (71%) and pure monitors in their use of media as a strategy for creating interest and for delivering services. On this measure the trainer-monitor group had an even lower percentage (14%).

When monitors were compared with liaison agents only seven differences were found: (1) content-administration, (2) activity-monitoring, (3) intensity-number of long-term contacts, (4) initiation of contacts by state, (6) knowledge source-paper, and (7) knowledge source-institutional.

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* Footnote 2 to Table 3, p. 32 in Firestone and Wilson, January 1982, erroneously labeled the symbol for "monitor-liaison" means as "monitor-trainers."

** Among the 14 significant comparisons involving pure trainers, pure monitors, and trainer-monitors, the trainer-monitor group mean was intermediate on 8 of the 14 measures. However, it was more extreme than the pure monitor group on 6 of the measures and was never more extreme than the pure trainers on any of the measures. The three most remarkable low scores for trainer-monitors were their low percent of mention of the curriculum content area (14%) and their low mention of expertise (0%) or media (14%) as strategies for creating interest and delivery services.

The means for the two pure types for these significant comparisons are all reported in Table 6.

Summarized briefly, liaison specialists provided more assistance on administrative matters, they engaged in much less monitoring, they worked on more long-term projects, they found that their contacts were initiated more by the ESA and less by the state than did monitor agents, and liaison specialists used a wider range of paper and institutional knowledge sources.

The monitor-liaison is much more a blend of the two pure types than is the monitor-trainer. With one exception where the monitor-liaison group mean very slightly exceeded the mean for pure liaison agents in (high) use of institutional knowledge sources, the means for the liaison group were always intermediate between the two pure types. Monitor-liaison scores were closer to pure monitors on three dimensions (administrative content, monitoring activities, and percent of ESA initiated contacts) but were more nearly in the middle range on the remaining three measures.

IV. CROSS-STUDY SYNTHESIS

In the previous chapter we summarized the findings of five recent studies of programs that employed external linking agents to assist schools in using externally-generated knowledge to solve problems and improve educational practices. In this chapter we shall compare the studies in the context of five topics:

A. Gross Similarities and Differences in Linking Agent Roles Across the Projects

B. Selection, Training, and Support for Linking Agents

C. Linking Agent Work

D. Linking Agent Effects and Outcomes

E. Effects of Program, Host Organization, and Clients on Linking Agent Activity

A. Gross Similarities and Differences in Linking Agent Roles Across the Projects

Location of linking agents by type of agency/service region and by type of school improvement program. Table 8 presents the data on the location of 428 linking agents who are described in the five studies summarized in Chapter III. In this attempt to classify these 428 agents, the available data for several of the studies posed problems which were resolved as indicated below. The organizations are listed in descending order by increasing geographic scope of the agents' service region. With respect to LEA-service agents, it should be noted that the DESSI, RDU, and RBS/LSI studies provide information on the roles of various LEA staff (e.g., superintendents, central office staff, principals, teachers, others) who assisted in their school improvement projects, but only the SDGP in its presentation of information on agents confounds local LEA linking agents with external linking agents. Thus, though more than two-thirds of the SDGP sample of linking agents (69%) was LEA-centered, almost none of the linking agents in the other four studies were LEA-centered.* Next closest to the LEA are the Educational Service Agencies (ESAs) where nearly half (47%) of all the linking agents were located. Because the RBS/ESA study strongly indicates that agents in compliance-oriented ESAs are far more heavily oriented toward monitoring than toward providing other forms of technical assistance, we have subclassified the ESAs on the basis of the predominant orientation of the type of agency in which the agent was located.*

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* At least 39 of the DESSI study agents were LEA-based, but only one of these agents, a Title IV-C local consultant, confined service to a single local LEA.

Agents from predominantly service-oriented ESAs constitute one-third of the total sample. They represent approximately two-thirds of the RDU agents and the RBS/ESA agents and nearly one-fourth of the SDGP agents.** Three studies (SDGP, DESSI, and RDU) employed some agents operating primarily at the state level--in SEAs, in other state-level service projects (i.e., in non-SEA-based NDN State Facilitator projects or in the RDU-NEA state association offices), or in Institutions of Higher Education (IHEs), which may view their school service regions as state-wide or as somewhat larger or smaller than state-wide. The numbers we have assigned to each of these three categories of state level agencies involve some guesswork, but may not be too much in error.*** The RBS Local School Improvement Study (RBS/ LSI) was totally laboratory-based. In addition, one RDU study agent was laboratory-based. Classification of the NDN D/Ds poses problems because we have no published information identifying the 68 D/Ds included in the DESSI study. Most D/Ds are located in LEAs, but some are located in ESAs, colleges and universities, regional laboratories, and nonprofit agencies. However, because nearly all D/Ds take a national service orientation, we have treated them as a separate group, rather than classifying them by type of host agency.****

The data in Table 8 indicates that there are marked contrasts among the five studies in the distribution of agents by type of agency, and especially

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*Our allocation of 56 of the 138 RBS/ESA agents to compliance-oriented ESAs is somewhat arbitrary. Firestone and Wilson, January, 1982, p. 30, indicate that at least 42 agents scored in the top third of their "monitor" scale. However, it appears that perhaps all 56 agents from the New Jersey county offices and an unknown number (perhaps 10 or 12) of the agents from two of the 11 Pennsylvania Intermediate Units in the sample were located in predominantly "compliance-oriented" agencies. Hence the actual number of agents in compliance-oriented ESAs may be from 42 to 68.

**A few of the NDN agents in the DESSI sample were also located in ESAs; however, we have classified these agents by their service region; state, if State Facilitator, and national, if D/D.

***The SDGP and DESSI figures are fairly accurate. We know that the NEA RDU project had 14 agents, but had to guess as to their location in the SEA or in the NEA state association office.

****We note that all six of the NETWORK's RDU agents were affiliated in some way with NDN. One agent was located in a regional laboratory and another in an IHE-based Teacher Center. We have classified the other four as being most like D/Ds, although some could have also been classified as belonging to "other state" or to ESA-service agencies.

Table 8. Location of Linking Agents by Type of Program And Organization

Organization Type	Region	School Improvement Program*					Total	Percent
		SDGP	RBS/ESA	DESSI	RDU	RBS/LSI		
LEA	local	94		1			95	22%
ESA - Monitor	sub-state		56				56	13
ESA - Service	sub-state	32	82	9	33		156	36
SEA	state	9		7	6		22	5
Other - State	state			31	8		39	9
IHE	state (?)	1		4	1		6	1
Labs	multistate				1	6	7	2
D/Ds	national			43	4		47	11
Total		136	138	95	53	6	428	99
Percent		32%	32	22	12	1	99	
				36				

*Program Abbreviations

SDGP	State Dissemination Grants Program
RBS/ESA	Research for Better School's study of Educational Service Agencies
DESSI	Dissemination Efforts Supporting School Improvement
RDU	Research and Development Utilization program
RBS/LSI	Research for Better School's Local School Improvement study

in terms of the service regions served by these types of agencies. More than two-thirds of the SDGP's agents are locally oriented, whereas more than two-thirds of the DESSI study agents are nationally oriented. Nearly two-thirds of the RDU agents are based in ESAs serving portions of a state, and, of course, all the RBS/ESA study agents are located in these intermediate units. Finally, all the RBS/LSI agents are based in a regional laboratory.

We have ordered the five projects from left to right to correspond, at least roughly, to Karen Louis' dimensions of agent scope and intensity (see Chapter II, Section B, pp. 2.20-22). Typically, SDGP agents served many individuals in several, sometimes many, school districts. Although there were exceptions, the agent's task was primarily confined to determining client information needs, forwarding information search requests to an information specialist, and then sometimes making deliveries and helping clients to screen, select, interpret, or perhaps even apply the retrieved information. SDGP agents often were confronted with a very wide range of requests for virtually any type of educational information from a broad range of types of information users. However, their role was primarily that of an information "resource finder" (i.e., retrieval of citations, abstracts, bibliographies, and sometimes copies of journal articles or reports). Probably next up the scale of intensity (and down the scale of scope) are the RBS/ESA study agents. Although Firestone and Wilson found three major field agent role types (curriculum expert/trainer, liaison, and monitor) as well as all combinations of these types, their data also clearly indicate that the monitor and the curriculum expert/trainer roles are those that differentiate agencies. All New Jersey County offices had agents with very high means on the monitoring role score and relatively low means on the curriculum expert/trainer role score. The reverse held true for the New Jersey EICs and a great majority (9 of 11) of the Pennsylvania Intermediate Units; these agents were low on monitor scores and high on curriculum expert/trainer scores. In general, monitor agents confined their school improvement activities to relatively simple forms of technical assistance that were primarily focused on school administrators. "Pure" monitors engaged in an average of 2.3 long-term projects with LEAs per year, spent an average of 11.6 percent of their time on such projects and spent only a fifth of their LEA contact time with teachers. By contrast, "pure" curriculum expert/trainers engaged in four to five times as many long-term projects with LEAs, tended to spend roughly twice as much of their time on long term projects with schools, and spent twice as much of their LEA contact time (42%) with teachers. However, none of these ESA roles afforded much opportunity for intensive work with a few client schools. Generally, the work was relatively broad in scope. County office staff were expected to monitor compliance with a wide range of federal and state laws and regulations. Although EIC and IU agents sometimes specialized in a particular curriculum area (e.g., reading or bilingual education), they often dealt with any grade level--from preschool to college programs.

By comparison, the majority of the DESSI study agents were associated with NDN, and most were Developer/Demonstrators (D/Ds) specializing in assisting schools to adopt just one program. The scope of the NDN State Facilitator (SF) theoretically was much broader, but was at least confined to familiarity with some or all of the approximately 120 to 140 D/D projects (circa 1979-1980) listed in the NDN catalogue, Educational Programs That Work. However, both the SFs and the D/Ds served a relatively large number of clients (see footnote, p. 2.22).

The RDU agents had a much smaller scope in terms of the range of knowledge resources they dealt with, and they served far fewer clients (3 to 12 sites per agent) at a much higher level of intensity, whether measured in clock or calendar time. They were also generally expected to deal with a much broader range of assistance skills that typically involved significant aspects of "process helping" and "solution giving." Indeed, the RDU agents also aimed to build, and partly succeeded in building, local capacity to replicate aspects of the problem-solving process itself.

Probably anchoring the end of the scope/intensity continuum were the RBS Local School Improvement study agents. Here, six agents worked with five sites and averaged more than two visits a month during the school year, in addition to numerous telephone calls. The RBS planning process apparently placed great demands on agents and client schools, a condition that often forced agents to assume many different technical and mediating roles.

However, despite the (real) differences in scope and intensity among the last three projects (DESSI, RDU, RBS/LSI), they are more alike than different when contrasted to the ESA or the SDGP agents. Agents associated with the former three projects all tended to work with a relatively small number of school sites, often worked with a local planning team (teacher, principals, sometimes others) and focused on assisting schools to define major education needs, search for appropriate, effective, (and it was hoped, R&D-based or practitioner-validated) programs and products; and then assisted schools in implementing these innovations. Moreover, to some degree, many attempted to institutiontalize not only the innovation, but also the problem-solving process by which it was selected and implemented.

It thus appears that perhaps three modal forms of assistance, or dominant linking agent strategies, are represented in this sample of studies, each representing approximately a third of the total sample of agents: (1) bibliographic and curricular information utilization (SDGP), (2) legal and programmatic knowledge utilization, including some consulting, technical assistance and training (RBS/ESAs), and (3) rational problem-solving focused (primarily*) on the adoption and implementation of validated products and programs (DESSI, RDU, RBS/LSI).

Classification of agents by dominant school improvement strategy and by size of agent service region. If we classify the sample of 428 linking agents by these three dominant strategies--(1) information-use assistance, (2) technical assistance, and (3) problem-solving/program implementation--and then cross-classify them by three levels of size of the agent's service region--(1) local, (2) intermediate, and (3) state, multistate, or national--we obtain the distribution shown in Table 9. These data strongly indicate that the great majority of the agents associated with each dominant strategy

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*The DESSI study included 12 local Title IV-C consultant/trainer agents who may or may not have subscribed as fully to this third strategy.

Table 9. Number and Percent of Linking Agents Distributed by Size of Agent Service Region Within Major School Improvement Strategies

	DOMINANT SCHOOL IMPROVEMENT STRATEGY						TOTAL FOR ALL STRATEGIES	
	Information Use Assistance (SDGP)		Technical Assistance (RBS/ESA)		Problem-Solving Program Implementation (DESSI, RDU RBS/LSI)			
Size of Agent Service Region	Nr	col. %	Nr	col. %	Nr	col. %	Nr	col. %
Local	94	69%	--	0%	1	1%	95	22%
Intermediate	32	24%	138	100%	42	27%	212	50%
State, Multi-State, and National	10	7%	--	0%	111	72%	121	28%
TOTALS	136	100%	138	100%	154	100%	428	100%

are to be found working within a service region of a particular size. Most of the information-use agents (69%) are found at the local level. All technical assistance agents are found at the intermediate level.* Most of the problem-solving/program implementation agents (72%) operate at state, multistate (i.e., regional), or national service levels. These particular distributions are purely descriptive. We have nothing approaching a random sampling of agents or school improvement programs within the United States that would permit us to generalize these results for the nation. However, the trend is at least provocative. It suggests that, as agents decrease the number of clients they serve in order to increase the intensity and breadth of services they provide to clients, the more likely it is that the agents will be operating in programs that are state, regional, or national in their service orientation. Viewed in another way, this notion suggests that the knowledge and skills required to accomplish the more complex, specialized and costly types of school improvement assistance may be in relatively short supply and thus are typically found only in the organization of major federal and state dissemination programs, whereas simpler and less costly services may be provided by many education specialists located in intermediate agencies and local school districts throughout the country. If this is so, the sobering fact is that both the RDU and the RBS/LSI programs were experiments that have been completed. Support for the existence of most of the DESSI agents is now severely threatened by Chapter 2 of the Education Consolidation and Improvement Act (ECIA). The "New Federalism" of the Reagan Administration may bring with it the demise of most of the more complex and ambitious strategies for school improvement that have been predominantly supported by federal funds, thus leaving schools with only less costly and intensive forms of external assistance.

B. Selection, Training, and Support for Linking Agents

Selection, training and support for linking agents have been issues of interest to designers and managers of programs employing linking agents almost since their inception. Havelock and Havelock's (1973) Training for Change Agents represents one of the earliest training resources specifically designed for "linking agents." However, at nearly the same time, the U.S. Office of Education had commissioned a major training resources development project to support its Pilot State Project (Mick, et al., 1973). This resource includes a set of 28 training modules for Pilot State Project directors, resource personnel, and field agents. Many of the training resources available at the time the projects included in this synthesis were initiated or operating are catalogued in the Educational Dissemination and Linking Agent Sourcebook (NIE Cooperative Project, 1977), and in Rosenau (1977). The importance of training and support for educational linking agents has received attention from several writers (Piele, 1975; Jung, 1976; Crandall, 1977; Butler & Paisley, 1978; Hood & Cates, 1978; Paisley, Grimes, Reisinger & Moir, 1979). Selection has received much less attention (Crandall, 1977; Hood & Pool, 1978). However, aside from brief treatment of training issues in the evaluation of the Pilot State Project (Sieber, Louis & Metzger, 1972; Louis & Sieber, 1979), along with some test data produced in the development of various training resources or assessment instruments, there has been little truely empirical research concerning the effects of selection, training, or support for linking agents.

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*This particular result is obviously an artifact of our choice of studies and the arbitrary method of study classification. Note also that intermediate-unit-level agents are, in fact, involved in all three types of strategies, and represent nearly half (47%) of the total sample. Inclusion of the RBS/ESA sample mainly introduces a third type of strategy, technical assistance, that is undoubtedly performed to some degree at all levels, but is probably performed most frequently by agents serving local (e.g., school district central office) or intermediate levels.

When we turned to the five studies reviewed in Section III, we sadly discovered that there is no opportunity for a synthesis: Four of the five studies provide no usable information whatsoever. However, this is not true of the RDU study. Spencer and Louis (1980) provide a fairly comprehensive report. It includes descriptions of training and support activities for each of the seven RDU projects, an analysis of RDU linkers' own assessment of the training and support they received, statistical analysis of the impact of training and support on job-related attitudes and behavior, and a discussion of overall findings in terms of implications for improving training and support of external linking agents. We shall conclude this section by summarizing some of the Spencer and Louis statistical findings. We also urge readers who are interested in these issues to read that report, since it contains much more information than is summarized below.

The chapter on impact of linker training and support provides one of the few available sources of substantial data ($N < 51$) on the relationships among: (1) training variables (linker perceptions of amount received, usefulness, satisfaction with timeliness of training, and satisfaction with the amount of training); (2) suppport variables (linker assessments of amount and usefulness of support for two roles, process helper and resource finder, from four sources, RDU project staff, host organization, other linkers, and expert consultants); (3) intervening variables (age of linker, percentage of time devoted to role, previous teaching experience); (4) linker attitude outcomes (sense of efficacy, overall job satisfaction, role conflict); and (5) linker behavior expectations, i.e., "to what extent do you actually perform these roles as a linking agent?" (process expert, three items; content expert, three items; general support, four items; reactive style, three items; proactive style, three items).*

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*There were ten linker behavior role items. The items in each scale were as follows:

Process expert: an evaluator; a process trainer; a conflict resolver.
Content expert: an expert in assessing the match between innovations and problems; a program implementor; a basic skills, career ed., or in-service specialist.
General support: an observer/historian; a resource person; a counselor or hand-holder.
Proactive style: a process trainer; a program implementor; a conflict resolver.
Reactive style: an observer/historian; a resource person; a counselor or hand-holder.

The correlations between training variables and the outcomes of job-related attitudes and behavior can be summarized as follows:

(1) There were no significant relations (20 correlations) among four training variables and five behavior variables.

(2) Among 15 correlations relating training to attitudes, only two were significant. Increased training is negatively related to perceived role conflict (r = -.46); the increased training provided linking agents with a clearer definition of their own roles and with techniques for dealing with roles. However, perceived usefulness of training was negatively related (-.50) to linker sense of efficacy (perceived influence over site outcomes). This finding is interpreted as an example of how training can be selectively effective, i.e., "linkers who had a high sense of efficacy may have been less impressed by the relatively simple training tools and experiences that were provided to them late in their project-related career. Linkers who felt less sure of what they were doing were more grateful for the information and clarification that were derived through training sessions" (Spencer & Louis, 1980, p. 56).

(3) The 16 linker support variable produced 19 significant correlations (out of 128) with eight attitude and behavior variables.* Several patterns of impact are indicated. Greater support (amount and usefulness) from consultants (with respect to either the process or the information roles) increased linkers' reported performance of a content specialist role. Greater support from other linkers, especially in terms of perceived usefulness, and especially in the process role, showed significant relationships with the linker's reported behavior in process specialist and generalist roles and also greater emphasis on supportive, reactive roles and on proactive roles. Greater amounts of support from project staff (in either process or information roles) seemed to reduce linkers' sense of role conflict. However, higher levels of support (either in perceived amount or usefulness) related to process roles was associated with lower levels of perceived efficacy. Spencer and Louis hypothesize that linkers with a low sense of efficacy may seek local support frequently and rely on it as useful.

In an additional analysis, Spencer and Louis computed canonical correlations among four pairs of sets of variables: support and attitude, support and behavior, training and attitudes, and training and behavior.* The results were disappointing. None of the four canonical correlation analyses resulted in a canonical correlation that was significant at the .05 level. In other words, there is no evidence of a strong relationship between training or support and attitudes or behavior for the entire sample of linking agents.

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*Due to variable Ns (31 to 35) for these data, p < .05 significance levels vary. The range of absolute values among the 19 significant correlations is from .32 to .46, with a median .37. Thus none of the significant relationships between support and training outcomes is particularly strong.

A somewhat different set of findings were produced, however, when the effects of moderating variables (age, teaching experience, percentage of the time devoted to RDU linking role) were examined. Each of these moderators was categorized and nominally coded.

Age. The analyses show that training and support had the strongest effects (correlations in the .6 to .9 range are reported) on the youngest (under age 33) linkers and the next strongest effect on the oldest linkers (over age 48), but there were almost no significant correlations between support or training and linker job attitudes or behavior for the middle-aged group of linkers. Moreover, there were differences in the pattern of relationships for the youngest and the oldest linker groups. Spencer and Louis hypothesize that both younger and older linking agents are more open to influence; younger linkers, because they realized they are inexperienced and need support; older linkers, because the change in job status may be more disruptive for someone who has been engaged in more traditional roles in education.

Teaching experience. Teaching experience also produced contrasts among three levels of experience; for example, among inexperienced (less than three years) teachers, the amount of training was negatively associated with job satisfaction (-.72); among moderately experienced (three to five years) teachers, training was positively associated with job satisfaction (.77); among the more experienced (over five years) teachers, there was no significant correlation.

Percentage of time in RDU role. This moderator variable produced few significant results. Those who committed least time (five to 12 percent) were more likely to be affected by differences in support structure. For example, low-time RDU linkers who had more support from other linkers were more likely to have low role conflict, were less likely to play the role of a content specialist, and were less likely to take an involved or proactive stance with clients. Among those committing between 12 and 50 percent of their time to RDU, very few significant relationships were found (however, perceived usefulness of training was related to playing a content specialist role, r = .82; process support from the linker's host organization was negatively related to job satisfaction, r = -.87). Finally, among those who committed more than 50 percent of their time, training and support variables had almost no significant relationship on attitudes or role behavior, the only significant relationship was a negative one (-.69) between perceived usefulness of training and sense of efficacy.

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*Canonical analysis is a technique for finding the maximum correlations between one set of variables and another set of variables. Stated briefly, canonical analysis finds a weighted combination of all variables in one set that has the maximum correlation with a weighted combination of all variables in the second set. An anlysis may produce none, one, or several statistically significant relationships among differently weighted combinations.

Spencer and Louis tentatively conclude: ". . . The types of training and support systems that were employed in the RDU project were not sufficiently robust or intrusive to counter the basic autonomy of the linking agent" (p. 62). They note that data in other RDU reports show that these linking agents tended to be most highly influenced by clients. In addition, it appears that predispositions and convictions, as well as previous job experience, may have greater influence on linker attitudes and role expectations than do training or support systems. However, the results do indicate that the support systems designed by the RDU projects or developed by individual linkers were more significant in shaping attitudes and role expectations than were formal training events sponsored by the project. One of the significant differences was that training was initiated by projects, whereas support systems tended to respond to linker requests. "Thus, support may be thought of as being more situation- and linker-specific, and usually deals with immediate problems and problem solutions. . . . The need for individualized approaches is highlighted by the fact that linkers with different background [age, years teaching experience] were affected by levels and sources of support in different ways. While the quantitative data that we have do not suggest clear patterns for the design of a contingency theory of training and support needs, they do suggest the clear need for such an approach." (p. 62)

The issue of selection remains largely unexamined. Although RDU project designers exercised considerable choice over which particular host agencies they chose to work with, the choice of agents was almost always a host agency decision over which RDU project directors had little or no direct control. In another RDU report, Louis and Kell (1981, p. 171) conclude that the RDU data on agents do not suport a "science of selection." The only characteristics of agents that emerged as significant were agents' age, teaching experience, and disposition to be "innovative" (inquiring, original, self-reliant, flexible) versus being supportive and low-profile (cooperative, dependable, industrious, stable). Teachers and principals both were more satisfied with agents disposed to the latter style. Older agents and agents with more teaching experience were more likely to play content specialist roles that reduce role conflicts and job stress, but were less likely to perform central boundary-spanning activities and generalist-coordinator roles. Although significant, the influence of these characteristics is not large. It appears that many different types of persons can perform effectively in these RDU field agent positions.

The concluding chapter of the Spencer and Louis report presents recommendations for improving training and support. In their conclusion to that chapter they question the value of greatly increasing the amount of training due to the expense. An alternative approach, suggested by the linkers themselves in interviews and conferences, would be the provision of resources to encourage and maintain opportunities for linking agents to interact with each other and with a broad range of other resources such as those found in universities, district and state education agencies, educational laboratories, and R&D centers, and at national conferences on the dissemination and utilization of knowledge and new practices.

C. Linking Agent Work

If only one study provides us with much information on training and support for linking agents, quite the opposite situation is found when we turn to the issue of linking agent activities and roles. All five of the studies provide some information, although, again, we find the richest set of data in the Abt study of RDU agents. In section IV.A. we noted that the agents described in the five studies could be grouped in terms of three dominant school improvement strategies: (1) Information Use Assistance, (2) Technical Assistance, and (3) Problem-Solving/Program Implementation. We further noted that these strategies and the studies of programs employing them could be organized along a dimension of decreasing scope and increasing intensity of linking agent work. As we examined the available data on linking agent work, it appeared that this dimension helped substantially to clarify differences among the studies in their findings concerning linking agent work, so we shall employ it again in this section by reviewing the studies in their order of decreasing scope and increasing intensity.

1. State Dissemination Grants Program Agents

One remarkable methodological similarity among the studies is the fact that four of the five employed factor analyses of linking agent activity items to derive empirical descriptions of linking agent roles.* The first of these results to be published was the NTS study of SDGP linker activities and roles (Decad, Madey, Royster & Baker, April 1981). The Butler and Paisley conceptualization of three modal roles and their relationship with selected linking functions (see Chapter II, Figure 2) directly influenced the NTS study. In this study, factor analyses of each of six sets of data produced essentially the same three factors: a communicating role, a resource finding role, and a facilitating role. Comparisons of "real" and "ideal" expectations of linkers themselves and of project directors revealed some small, but perhaps meaningful, differences in item factor loadings. However, the remarkable aspect of the NTS analysis is the robust nature of those three factors.

Although directly emanating from the Butler and Paisley model, the results were not quite what was expected. Why did this happen? Technically, a major flaw in the NTS analysis may be a too literal reading of the Butler and Paisley model (Figure 2). Butler and Paisley were careful to label their figure "three modal linking roles and their relationship with selected linking functions" (emphasis added). For purposes of illustration, Butler and Paisley graphically located each of 15 highly generic linking functions within their three-mode triangle. The NTS researchers selected 13 of these 15 functions (omitting "monitoring products" and "evaluating") and then wrote an item for each function that provided one parenthetical example of each function, i.e., "Communicating (e.g., maintaining open personal communication with clients)." This particular item illustrates the problem of translating the Butler and Paisley schema to a very short item list. In the Butler-Paisley model, communication is one of the most centrally placed items, since they obviously realized that communication would be an important part of any of their three modal roles. Moreover, it is obvious that linkers confront many communication challenges beyond communicating with clients (e.g., communicating with resource base staff, host agency staff, project directors, colleagues). Of course the "e.g." example was intended as an illustration, but it can obviously bias the response to the extent that the item becomes "communicating with clients," which then, not unsurprisingly, results in its being empirically associated with two other items: "Disseminating (e.g., sharing information with clients in a two-way process)" and "Marketing (e.g., promoting [client] awareness of available services)."

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*With only six agents in the RBS/LSI study, factor analysis was not very practical.

Another example of probably unintentional bias can be seen if we examine the four linking functions Butler and Paisley most closely associated with the modal role of process helper: planning, managing conflict, analyzing problems, and evaluating (see Figure 2). In the NTS items we find the following examples given:

> "Planning (e.g., preparing for future needs and services)"
>
> "Managing conflict (e.g., helping others resolve discord)"
>
> "Analyzing problems (e.g., translating client problems into informational and resource needs)"
>
> "Evaluating" [No item was provided for this function.]

As we examine these three items, we note that only the example given for "managing conflict" contains any content that might be clearly related to the modal process helper role. However, this particular item was dropped from the analysis, apparently because it did not correlate very well with any of the other 12 items! The other two items contain examples that have no resemblance to the process helper role. Thus, with only one item to represent this role, and with only three factors extracted, it seems obvious why the NTS analysis failed to find a Process Helper role factor.

Essentially the same type of reason can be given for the NTS analysis failing to find a distinct Solution Giver role. Among the five functions closest to this role (see Figure 2 again), the monitoring products item was omitted. The remaining four items were given these examples:

> "Marketing (e.g., promoting awareness of available services)"
>
> "Disseminating (e.g., sharing information with clients in a two-way process)"
>
> "Implementing (e.g. assisting clients to install a new procedure)"

"Producing (e.g., developing materials or procedures for client utilization)"

Although "marketing" and "disseminating" are clearly client-oriented, they hardly connote the image of "overseeing the adoption and institutionalization of a particular innovation" (Piele) or the "entitlement to represent one solution or set of solutions to the client . . ." (Butler and Paisley). And indeed, as we have noted, these two items join with the "communicating" item to define the NTS "communicating" factor. Thus "implementing" and "producing" remain as the only two functions that are at all close to the Butler and Paisley Solution Giver role.

Because the NTS item set contained too few items to define clearly either the Butler and Paisley Process Helper or Solution Giver modal roles, most of the items spanning the side of the Butler and Paisley triangle between the Process Helper and the Solution Giver apexes (specifically, planning, influencing, producing, and implementing) are combined into a general "facilitating factor," which in fact accounts for more than two-thirds (69%) of the common variance represented by the three factors in one of the NTS analyses of linking agents (see Decad, Madey, Royster & Baker, 1981, p. 13). The second factor, "resource finding," accounting for only 19 percent of the common variance, is represented by two items, both containing examples with reference to information: "securing and arranging information for client problems" and "translating client problems into information and resource needs." Perhaps the most surprising finding of all is that the third NTS factor, "communicating," should account for only 12 percent of the common variance. As we have noted, it is represented primarily by three items (communicating, marketing, dissemination), all with examples that have clear reference to very general communication with clients. However, these three items are not very strongly associated; indeed, the average intercorrelation among these three items is only .43, which is only slightly higher than the average intercorrelation for the entire set of 12 items (.415).

Now, beyond the rather limited and particular choice of items, there is another very important reason for the NTS failure to find strong process helper or solution giver factors, as discussed in Section III. A., above. Namely, that approximately two-thirds of the SDGP linking agents in this sample were LEA-based. Table 1 (see Section II. A.) suggests that the great majority of LEA-based SDGP linking agents confined their services to "spread" or "spread and exchange" (of information). Very few became involved in "implementation."* Thus, neither the sample of items nor the sample of subjects in the NTS study provides us with a very broad conception of linking agent work. However, the NTS factor analysis results are an excellent representation of agent work for those agents employing the Information Use Assistance strategy discussed in Section IV. A. (See Table 9.) After close examination of the items loading on each of the three NTS factors, we suggest that the NTS labels be made more specific, as follows:

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*The item means confirm this interpretation. "Implementing" ranked 9th and "producing" ranked 12th among the 12 items in the extent to which linking agents reported that they performed these functions. (See Decad et al., p. 32.)

Factor I: Facilitating client knowledge utilization

Factor II: Information resource finding

Factor III: Communicating with clients

When we examine item means, we discover that among the three top-ranking items in order of the extent to which linking agents report that they perform the item function, "Communicating--maintaining open personal communication with clients" ranks first and "Disseminating--sharing information with clients in a two-way process" ranks third.*

Though communicating-with-clients items are high in frequency, the three lowest frequency items are: "Producing--developing materials or procedures for client utilization" (ranking 12th; note that in the SDGP, this function tended to be performed by information specialists or others, but not by linking agents, especially not those who were LEA- or school-based); "Intervening--proactively seeking client needs" (ranking 11th; this item displays modest loadings in the .4 range on all three factors); and "Analyzing Information--determining the relevance of information to client problems."

We noted in Section III. A., Table 2, that 90 percent of the SDGP linking agents classified by type involved some combination of "pure" or "combined" roles in which the "communicator" role played a prominent part. By contrast, linking agents who placed a relatively higher emphasis on information resource finding and/or facilitating client knowledge utilization (than on communicating with clients) constituted only 10 percent of the sample.

After examining the NTS data on the SDGP sample of linking agents, we thus conclude that most of these NTS agents exemplify modest variations in functional patterns of essentially one of the three modal roles as defined by Butler and Paisley: the Resource Finder. Note how the "entitlement" for this role was defined:

> RESOURCE FINDER. At the lowest level of entitlement, a linking agent serves as intermediary between the client organization and knowledge resources. The linking agent may conduct information searches or make interpersonal contacts to find answers to clients' questions. The linking agent "negotiates" clients' questions to make them answerable, but does not undertake an analysis of the client organization to determine if the right questions are being asked. Information is turned over to clients in the form of bibliographies, documents, briefing memos,

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*The second ranking item is "Monitoring ideas--keeping abreast of recent educational practices and innovations." This particular item has moderate loadings (.3 or higher) on all three of the factors.

> etc. Only infrequently is the resource finder called upon to make presentations to clients, and the structuring of information into a set of recommendations usually goes beyong the entitlement of his role. (Butler and Paisley, 1978, p. 30)

Note again that the three least frequently performed items in the NTS instrument were: "Producing--developing materials or procedures for client utilization"; "Intervening--proactively seeking client needs"; and, "Analyzing Information--determining the relevance of information to client problems."

It is also obvious that most SDGP agents also assumed the unspecialized generalist or "scout" role identified by Butler and Paisley "that primarily involves communication functions alone." In terms of the specializations triangle (displayed at the bottom of figure 2) we might depict the work of the SDGP agents as being "mapped" as shown in Figure 5 (overleaf). Perhaps with more appropriate instruments and with a more conventional method of typing linkers, we might have found a few agents playing significant process helper or solution giver roles. However, given this sample of agents, we doubt that many would have been found. Rather, Butler and Paisley noted (1978, p. 32) that the boundaries between the modal roles are permeable and at least some linking agents seek to extend their entitlement from one role (here primarily Generalist Linker and then Resource Finder) to others.* There is some evidence that this was occasionally true of linking agents in the State Dissemination Grants Program.

2. The RBS/ESA Study

The RBS study of Educational Service Agencies (ESAs) provides the second factor analysis to be examined. Firestone and Wilson (1982, p. 10) indicate that they began with responses to a list of 11 items "that come from previous role conceptualizations as discussed by Butler and Paisley (1978) and from preliminary discussion with field agents." Their list of 11 "role items" is aptly named. Resource Finder is one of the 11 roles, and Group Process Trainer (not Helper) is another. See Section III. E., Table 5, for the full list. We thus see that the RBS items represent roles themselves, as contrasted to the functions that compose roles used in the NTS analysis. The result, then, is an analysis that starts at a more aggregate level of behavior than was examined in the NTS study. Moreover, the RBS roles obviously were derived mainly from discussion with ESA field agents. The role titles sound more realistic, e.g., Workshop Presenter,

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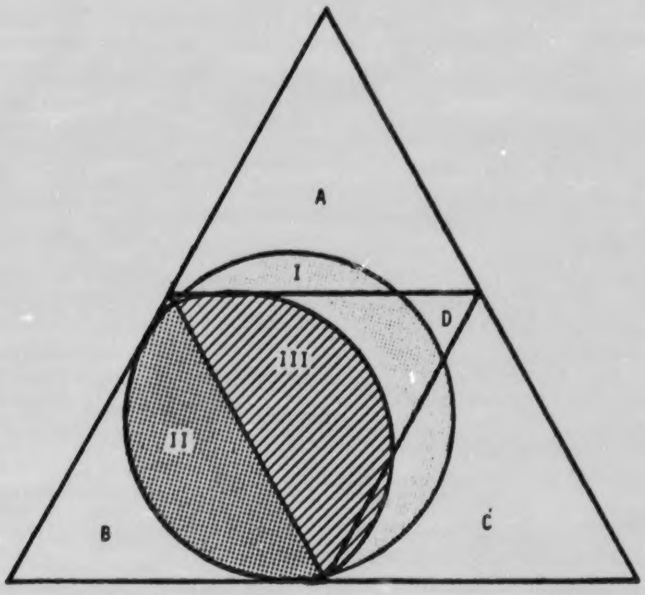
*Decad et al., p. 19, note that better educated and more professional experienced linkers tended to play a Facilitator role more frequently. Education level of the linker was marginally related also to the Resource Finding role.

Figure Five

A MAPPING OF THE NTS (SDGP) FACTORS ON THE BUTLER-PAISLEY ROLE SPECIALIZATION TRIANGLE



Butler and Paisley Specializations

A = Process Helper

B = Resource Finder

C = Solution Giver

D = Generalist Linking Agent, "scout"

NTS Factors

I. Facilitating Client KU

II. Information Resource Finding

III. Communicating with Clients

On-call Consultant, Needs Assessor/Planner. Using the conventional factor extraction rule-of-thumb to retain all factors with Eigenvalues greater than 1.0, the RBS researchers extracted and rotated three factors.*

Four of their roles -- Curriculum Expert, Curriculum Designer, Workshop Presenter, and Group Process Trainer -- all displayed loading above .5 on the first factor, which was labeled Expert/Trainer. This factor extracted 19 percent of the total variance and accounted for 44 percent of the common variance. However, two of the items, Curriculum Designer and Group Process Trainer, were the least frequently mentioned of the 11 items. After they omitted these two very-low-frequency items, the simple average of the remaining two items, Curriculum Expert and Workshop Presenter, is 2.34 on a scale that runs from 0 = "not at all" to 4 = "a very great extent."

Three roles -- Resource Finder, Needs Assessor/Planner, Coordinator -- all displayed loading above .5 on the second RBS factor, which was labeled Liaison. This factor extracted 14 percent of the total variance in the set of 11 items and accounted for 33 percent of the common variance. However, none of these three roles is in fact very well defined in terms of the three factors, since their commonalities range from .36 to .44. In other words, much less than half of the variance of these items is explained by the three factors. Moreover, the factor loadings indicate that these three role items are not very strongly correlated with each other (correlations in the .3 to .4 range). However, the simple average of the three items is 2.88 (and the average among agents from Pennsylvania Intermediate Units is 3.01) on the 0 to 4 scale; thus, this loose cluster of three roles appears to contain some of the more frequently performed roles played by most ESA agents, with the one exception noted next.

The role labeled "Monitor who identifies discrepancies between regulations and practice" was the only role item with a loading (-.67) above the ±.5 cutoff on the third and last factor. However, three other roles displayed positive loading of .3 or above on the third factor. They indicate that ESA agents who play heavy monitoring roles tend not to play Proposal Writer, Workshop Presenter, or Curriculum Designer roles. These negative associations between monitoring and other roles help to account for the emergence and retention of this third RBS factor (with an Eigenvalue just above the 1.0 cutoff criterion). This factor extracted only nine percent of the total variance in the set of 11 items, but it accounts for 22 percent of the common variance. The overall mean for this item was 2.23, slightly above the midpoint of the 0 to 4 frequency scale. However, as we noted in section III. E. this one item serves as a powerful discriminator of ESA agency types. The average for New Jersey EIC field agents on this item was 0.67; for Pennsylvania IUs agents it was 1.52, but for New Jersey County Office agents it was 3.61. This is indeed a remarkable range for means on a scale that ranges from 0 to 4. Three of the 11 RBS roles items failed to display loading above .45 on any of the three factors. They were On-call Consultant, Proposal Writer, and Sales Person.

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*Although not reported in the original table, our calculations indicate that the three factors account for only 42 percent of the total trace variance. None of the item communalities exceed .63; the average communality is .42 and one is as low as .17. We conclude that the correlations (not reported) among the 11 role items were generally low, perhaps with none exceeding .70.

Now what can we really conclude from this factor analysis? Perhaps, first, that commonly defined roles are something like brief job titles. They appear to identify the general work performed, but they really don't tell us very much specifically and probably convey a lot of ambiguity. Technically, we wish that Firestone and Wilson would have published the items' means, standard deviations, and correlations, as were provided in the NTS analysis. Without these data, we can only roughly estimate such things as correlations among the role items or the distribution of scores for the role items. However, the reported factor loadings make it clear that, among 11 roles, there were only two relatively weakly associated clusters of roles. The three factors accounted for only 42 percent of the variance in the set of 11 items. Thus, more than half the variance was not accounted for. In fact, over half the variance in the Monitor role item is not explained by the factor analysis results! The same holds true for all three of the role items that define the Liaison factor. And when we turn to the one cluster of items where three out of the four items display communalities above .5--the [Curriculum] Expert/Trainer group--we discover that two items were discarded because of very low (unreported) item means. The remaining two items appear to have a correlation that may be as high as .5.

In this instance, factor analysis was a powerful tool applied to weak data. However, it may have served one useful purpose; namely, to suggest which items might be grouped to form the very small scales (of three items, two items, and one item!) that were then employed in the subsequent analyses. Aside from this utilitarian purpose, we can't take the RBS factor analysis very seriously. The items are not well explained in terms of the factors, and the factors are not well defined in terms of the items. The main fault, of course, was the failure to provide enough items that would display some substantial patterns of clustered relationships for each anticipated factor. Had the RBS researchers asked about some of the underlying activities or functions performed by agents playing these 11 roles and then based their analysis on a larger set of items representing these activities or functions, they might have found a much richer and perhaps far more interpretable analysis. As it is, we are left with the general conclusion that items composed of short common names for roles (e.g., Workshop Presenter, Coordinator) do not correlate very strongly with each other. However, with the exception of one role, Monitor, most of the correlations were positive.

Despite these technical problems, the remarkable point is that the role item scales, especially "Monitor" and "[Curriculum] Expert/Trainer" did discriminate powerfully among the three types of educational service agencies (EICs, IUs, and COs). Moreover, the field agents who were designated as "pure" monitors were in fact very different in their contextual dimensions from agents who were either "pure" trainers or "pure" liaison types. Our best information on the work of ESA agents is found not in the RBS factor analysis results, but rather in their interview data with persons who scored high on the scales that were created.

3. The DESSI Study

Cox and Havelock provide the reader with even less information on their factor analysis of the DESSI External Facilitators. We have the complete list of items and their means and a descriptive listing of the items that were associated with each factor, but no report of standard deviations, correlations, or factor loadings and no description of the factor method.

Despite this massive lack of technical information, which we assume will eventually be published, we like the Cox and Havelock list of items. It appears to have been built with an intent to understand the details of an agent's work. It is clearly task- and activity-oriented and focused on the program adoption/implementation sequence. Initially, five categories of external assistance were identified: Initiating relationships, Assisting clients in deciding on new practices, Assisting clients in preparing for adoption, Assisting clients in implementing practices, and Follow-up activities. Then five or more items were prepared that described specific activities within each category. The final instrument contained 30 items. When factor analyzed, 27 of the 30 items were grouped into seven factors, and only three items remained unassociated with any one factor. In one case, "Making library and computer search for materials," the activity was very rarely done.* However, in the other two cases, "Assessing needs," and "Putting out fires," small, but significant, relationships were reported with several of the factors, indicating that these activities were apparently relevant at several stages.

Examination of the difference in item placement in the a priori logical categories and in the factor clusters reveals essentially the following. All the activity items initially placed in the Initiating relationships category remained there, and with no additions, following the factor analysis. At the other end of the adoption/implementation sequence, the five items in the a priori Follow-up activities cluster formed two small factors: a three-item group concerned with evaluation and a two-item group concerned with continuation and developing new users. (The latter appears to be the least well-defined factor in the analysis.) However, the two intermediate, preimplementation a priori categories, Assisting clients in deciding new practices and Assisting clients in preparing for adoption, showed the greatest degree of regrouping: away from a logical temporal sequence and toward the type of client involved. Note the factor labels: Administrator Adoption Preparation, Teacher Adoption Preparation, and Support of Teachers (which included one or more items from each of all three of the intermediate a priori categories). Among the five original items on the a priori Assisting clients in implementation category, three remained in a redefined Implementation Specifics factor. One item, "Putting out fires," as we have noted, showed modest loadings on several of the factors (including Implementation Specifics, Administrator Adoption Preparation, Evaluation, and Continuation/ Diffusion). The fifth item, "Maintaining support among school personnel" (during implementation) joined similar items in other phases to create the Support of Teachers factor.

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*Well over half the DESSI External Facilitators indicated they "never" did library and computer searches for clients. These agents may have been "resource finders," but they were rarely information resource finders comparable to the SDGP agents.

We thus discover that the work of these DESSI "Solution Giver" agents is organized in four distinct, pre-implementation clusters:

- Awareness Initiation (initiating relationships)
- Administrator Adoption Preparation
- Teacher Adoption Preparation
- [Maintaining] Support of Teachers [and other school personnel]

Maintaining the Support of Teachers continues into the implementation/ follow-up phases, where three clusters of work are found:

- Implementation Specifics
- Evaluation
- Continuation/Diffusion

As we noted in Section III. B., all the DESSI External Facilitators, except the local Title IV-C consultants/trainers, displayed highly similar patterns in their frequency of performance of activities placed in these seven-factor work clusters. Their greatest emphasis of assistance was placed on Awareness Initiation and Teacher Adoption Preparation. Most activities in these two clusters were performed, on the average, more often than once a month, and some ("Contacting new clients," "Providing detailed information") were performed, on the average, almost weekly.* The next two work clusters in terms of frequency of performance (performed a little less than once monthly) were Implementation Specifics and (Maintaining) Support of Teachers (and other school personnel).** Next, but markedly less in frequency of performance (less than once a month but more than once a year), was Administrator Adoption Preparation. Finally, it appears that the least amount of effort (averaging somewhat more than about once a year, but very much less than once a month), was spent on Evaluation or Continuation/Diffusion activities.

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*Recall that the DESSI sample of agents spent a little more than half their time interacting with clients. The remaining time was spent in administration, travel, professional development, and other tasks. Of the total time spent with clients, half was spent in initiating relationships and assisting in adoption preparation. The other half was spent in helping with practice selection, implementation, and follow-up.

**We note that the NDN D/Ds were more concerned with Implementation Specifics than were NDN SFs, as might be expected, given individual D/D's concern with helping clients install the D/D's own specific program.

The local IV-C consultants also spent little effort on Continuation Diffusion activities; however, they spent even less effort on Awareness Initiation, which was one of the high-effort work clusters for other DESSI agents. The three major work clusters for local IV-C agents, in descending order of performance, were: Implementation Specifics, Evaluation, and Teacher Adoption Preparation.

The DESSI study thus provides us with two distinct images of external agents. One is the image of the [NDN or state IV-C] Solution Giver; the other corresponds more to the technical assistance specialist, e.g., in evaluation or training. The latter group may in fact be more like the RBS/ESA [curriculum] Expert/Trainer agent than they are like the [NDN or state IV-C] Solution Giver.

4. Linking R&D With Schools (RDU) Agents

Our richest set of information on linking agent work is found in the Linking R&D with Schools study and is based on a sample of 53 of the approximately 100 field agents supported by the seven RDU projects. These persons were known as "linking agents," "generalists," "coordinators," or "facilitators," but all were expected to provide in-person services to schools at school sites.* Moreover, these agents were viewed as coordinators of process assistance that schools would need, including orienting school personnel to a rational problem-solving model, assisting them in defining needs, selecting appropriate solution(s) in the form of R&D-based or practitioner-developed and validated products and practices, and then assisting school staff to plan for, and implement, improved curriculum and staff development practices. The only responsibility these RDU agents did not have, generally, was that of finding exemplary programs. Other RDU project specialists had this function. However, these agents were expected to help schools locate human resources (e.g., program experts, trainers) who could assist them with implementation. (And, as we shall see in Section IV-D, this additional assistance obtained by agents was extremely effective.)

In all cases, the RDU agents were located outside the RDU project office in various types of "host organizations" (see Section IV-B, Table 8). All the agents were educators, most with recent experiences working with school districts, either as consultants or as staff of a state education agency or association. However, the employment as RDU agents varied enormously, with many (approximately 40%) committing less than a fourth of their time to the effort, whereas for others (approximately 25%) it was nearly or completely a full-time job. For some, it represented their first professional position after obtaining an advanced degree (all but one held advanced degrees; 70% held M.A.'s, 30% held doctorates), whereas for others it was their last position prior to retirement. But for most it was a midcareer position. The average age was 41. Slightly over half the agents in the sample were male. Three-fourths of the agents had previous experience with other federally funded programs; two-thirds had previous experience with other "linking" roles; but only onethird had previous experience with the implementation of R&D products.

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*Note that this is in marked contrast to the majority of the DESSI External Facilitators, who, according to Cox and Havelock (1982, pp. 6-7), were much less familiar with specific sites.

What roles did these RDU agents play? Table 10 displays the ranks and mean ratings for their reports of expected and actual performance for each of ten roles. At the bottom of Table 10 are three role-specialization scales -- General Support (GS), Process Expert (PE), and Content Expert (CE) -- that were formed by combining role items. Also included are two agent-style scales, Reactive Style (R) and Proactive Style (P), that were also formed by recombining some of the role items. Each role item is marked to indicate which scale(s) it belonged to. In terms of actual performance, two "general support" (GS) roles--Resource Person and Coordinator--tied for first place with means equal to 4.2 (on a five-point scale); thus most RDU agents must have rated these roles as played to a great or very great extent. The next six roles all display mean ratings between 3.0 and 3.3, which is probably not a statistically significant difference (3.0 = "to some extent"). Two more of the "general support" roles--Observer/Historian and Counselor or "Handholder"--are among the three roles with mean ratings of 3.3. We thus see that among the five highest rated items, in terms of actual reported performance, are all four of the items in the General Support Scale. Moreover, all three of the Reactive Style items are among these five items. The scale means at the bottom of Table 10 indicate that the mean for General Support items (3.75) is significantly higher than the means for Process Expert (2.93) or Content Expert (2.87). Also, the Reactive Style mean (3.63) is significantly higher than the Proactive Style mean (3.13). Among the ten individual roles, only the Program Implementor and Evaluator roles were performed relatively infrequently.

These data indicate that RDU field agents saw themselves as playing many roles. In average frequency of performance, the General Support roles were played much more frequently than either the program change Process Expert or the Curriculum Content Expert roles. Moreover, the Reactive Style roles were played significantly more often than the Proactive Style roles. In terms of individual roles, the RDU agents saw themselves, in their expectations and in their general performance, primarily as resource persons and coordinators and less often as program implementors or evaluators. However, they expected to play, and reported that they did play, six other roles "to some extent." Generally, their actual role performance was consistent with their expectations, with perhaps one exception: Most agents expected to play the role of expert in assessing the match between innovations and problems more than they reported that they actually played this role. The remarkable points are that most agents tended to play General Support roles (as contrasted to the Process Expert or Content Expert roles) and to engage in a relatively low-key, reactive role style, rather than a more intrusive, proactive style.

Table 10. Ranks and Mean Ratings of RDU Field Agents' Expected and Actual Extent of Performance of Various RDU Agent Roles

FIELD AGENT ROLES	Field Agents' Expectations			Actual Performance		
	Rank	Mean*	S.D.	Rank	Mean*	S.D.
Resource Person (GS)(R)	1	4.5	.7	1.5	4.2	.94
Coordinator (GS)	2	4.3	.9	1.5	4.2	1.0
Counselor or "Hand-Holder" (GS)(R)	6.5	3.2	1.2	4	3.3	1.1
Observer/Historian (GS)(R)	6.5	3.2	.93	4	3.3	1.1
Process Trainer (PE)(P)	3.5	3.5	1.1	4	3.3	1.1
Expert in Assessing the Match Between Innovations and Problems (CE)	3.5	3.5	.9	7	3.0	.95
Conflict Resolver (PE)(P)	5	3.3	1.1	7	3.0	1.1
Basic Skills, Career Education or Inservice Specialist (CE)	8	3.0	1.2	7	3.0	1.2
Program Implementor (CE)(P)	10	2.6	1.2	9	2.6	1.3
Evaluator (PE)	9	2.8	1.2	10	2.5	1.1
SCALES FORMED WITH THESE ROLE ITEMS						
General Support (GS)	1	3.80	--	1	3.75	--
Process Expert (PE)	2	3.20	--	2	2.93	--
Content Expert (CE)	3	3.03	--	3	2.87	--
Reactive Style(R)	1	3.63	--	1	3.60	--
Proactive Style(P)	2	3.13	--	2	2.97	--

*Response Scale:

5 = to a very great extent
4 = to a great extent
3 = to some extent
2 = to a little extent
1 = not at all

As in the RBS/ESA study, the Abt researchers also correlated and factor-analyzed the role-rating data. These results are not reported, but apparently the Abt researchers also encountered the same type of very low intercorrelations among roles, since they state, "At this point it should be noted that a number of the original questionnaire items, including some roles and activities which the average agent performed to a great extent, did not load highly on any of the factors . . . and for this reason they were not included in the scale" (Louis, Kell, et al., pp. 124-125). In fact, the three scales that were actually formed were composed of only five of the original ten items, as follows:

Program Change Expert (three items)

- Expert in assessing the match between innovators and problems
- Program implementor
- Evaluator

(Note that this scale combines two *a priori* Content Expert roles with one Process Expert role. The scale mean is 2.7, indicating that this factor scale role was not too frequently performed.)

Content Expert (one item)

- Basic skills, career education, or inservice specialist

Generalist-Coordinator (one item)

- Coordinator

We thus see that half the ten roles showed no appreciable loading on any of the three factors. Although neither item correlations nor factor loadings were reported, we may assume that much less than half the total variance in the set of ten items was extracted. With a reported alpha coefficient of .75, even the average intercorrelation among the three items in the Program Change Expert scale is only .50. Louis, Kell, et al. (p. 125) note that the only frequently performed role that emerged from this factor analysis was Generalist-Coordinator. And here the surprising point is that apparently none of the other high frequency *a priori* General Support roles (Resource Person, Observer/Historian, Counselor or "Hand Holder") showed appreciable loadings on any of the three factors.

Agent activities. The Abt researchers went well beyond the examination of global definition work roles. Based on interviews with a sample of agents, they generated the list of 16 routine activities displayed in Table 11, which RDU field agents were asked to rate in terms of importance of the activity and in terms of the amount of time spent. Two activities stand out in terms of time spent: Meetings and Writing Reports/Filling Out Forms. The next eight activities are within ±0.2 of the score 2 (= "a moderate amount of time"). Scoring somewhat lower, between 1.5 and 1.7, were four additional activities. Finally, two activities, Working with Individ-

Table 11. Ranks and Mean Ratings of Perceived Importance and Actual Amount of Time Spent on Various RDU Agent Activities (N = 43)

Factor Scale*	FIELD AGENT ACTIVITIES	Importance			Amount of Time Spent		
		Rank	Mean**	S.D.	Rank	Mean***	S.D.
BS	a. Meetings with small planning groups at the sites	1	2.8	.5	1.5	2.5	.6
BS	b. Writing reports/filling out forms	11.5	2.1	.6	1.5	2.5	.7
--	c. Arranging, designing or conducting workshops	3	2.6	.6	3	2.2	.8
BS	d. Traveling from site to site	10	2.2	.8	4	2.1	.7
BS	e. Promoting or explaining the RDU program	4.5	2.5	.6	6.5	2.0	.6
--	f. Working with individual administrators	4.5	2.5	.7	6.5	2.0	.8
BS	g. Organizing, preparing, and delivering materials	7	2.4	.7	6.5	2.0	.6
--	h. General meetings with site staff	7	2.4	.5	6.5	2.0	.7
PD	i. Developing yourself professionally	2	2.7	.5	9.5	1.9	.7
BS	j. Meetings with RDU central project staff	9	2.3	.5	9.5	1.9	.7
PD	k. Reading materials about R&D products	7	2.4	.7	11	1.7	.6
BM	l. Managing budgets	11.5	2.1	.7	12.5	1.6	.7
--	m. Designing, administering, and analyzing evaluation materials	13.5	2.0	.7	12.5	1.6	.7
AT	n. Observing teachers	13.5	2.0	.7	14	1.5	.7
AT	o. Working with individual teachers	15	1.8	.8	15	1.3	.6
--	p. Working with parents or volunteers	16	1.6	.7	16	1.0	.3

*Factor Scale (see text)

**Response Scale:

3 = very important
2 = somewhat important
1 = of little or no importance

***Response Scale:

3 = a great deal of time
2 = a moderate amount of time
1 = little or no time

ual Teachers and Working with Parents or Volunteers, received very little or none of the agents' time. The importance RDU agents attached to these activities tended to mirror the amount of time spent, with perhaps four exceptions. In terms of the item rankings, agents spent much more time writing reports and filling out forms that they felt necessary (in part due to the RDU project documentation/evaluation requirements), and they spent much more time traveling from site to site than they might have liked. Conversely, they rated developing themselves professionally as second highest importance, but were able to spend relatively less time on this activity, and, in like manner, they rated reading materials about R&D products as more important than the amount of time they spent on this activity.

These 16 items were also factor-analyzed (detail not reported in published reports) with the result that 11 of the 16 items loaded on these four factors:

(BS) 1. Boundary spanning activities. This scale includes a number of activities that are closely associated with traditional definitions of the Boundary Spanning role; that is, representing one's organization to the outside world and acting as the organization's agent of influence over external organizations. The items making up this scale are: meeting with small planning groups at the sites, writing reports/filling out forms, traveling from site to site, promoting or explaining the RDU program, organizing, preparing or delivering materials, and meeting with RDU central project staff. The standardized alpha for this scale is .78. [Average intercorrelation = .37]

(BM) 2. Budget management. This scale consists of one item: managing budgets.

(AT) 3. Activities with teachers. This scale comprises two items: observing teachers and working with individual teachers. The standardized alpha for the scale is .73. [r = .57]

(PD) 4. Professional development. This scale is composed of the following items: developing yourself professionally and reading about R&D products. The standardized alpha for the scale is .68. [r = .52]

(Items appearing in these four factor activity scales are marked in Table 11 respectively: BS, BM, AT, or PD. Items marked with a dash in Table 11 were not included in any of the four scales.)

Table 12 displays the intercorrelations of these role and activity scales. Among the three role scales, there is only one significant correlation. Agents who tended to play a coordinator role tended not to play a content specialist role. The correlation, however, is not large (-.26). Among the agent activity scales, there is also only one significant correlation: Activities With Teachers showed a small positive correlation (.28) with Boundary Spanning activities, but, with this one exception,

Table 12. Intercorrelations of RDU Roles and Activities

		ROLES			ACTIVITIES			
		Program Change Expert	Content Specialist	Generalist Coordinator	Boundary Spanning	Budget Management	Activities with Teachers	Professional Development
Roles	Program Change Expert	1.00						
	Content Specialist	-.04	1.00					
	Generalist-Coordinator	.08	-.26*	1.00				
Activities	Boundary Spanning	.41*	.04	.33*	1.00			
	Budget Management	.00	.09	.25*	.13	1.00		
	Activities with Teachers	.14	.01	.06	.28*	.21	1.00	
	Professional Development	.06	-.03	.25*	.10	.00	.20	1.00

*Significance ≤ .05

none of the activity scales is significantly related to the others. However, there are four statistically significant correlations between the role and the activity scales. Agents who played a Coordinator role more frequently also tended to perform Boundary Spanning, Budget Management, and Professional Development activites more frequently. Boundary Spanning activities are also positively associated (.41) with the Program Change Expert role. There is no significant relationship between the Content Specialist role and any of the activity factor scales.

Table 13 displays the correlations between these RDU agent role and activity scales and a selected set of 24 other RDU study measures.* The following brief comments will indentify some of the statistically significant relationships.

Age and teaching experience. RDU agents who were younger or less experienced (the correlations of these two variables is .54) performed Coordinator roles and Boundary Spanning activities significantly more frequently than did older or more experienced agents. However, older agents tended to play the Content Expert role more often than younger agents. There are no other significant relations between age and experience and other roles or activities.

Status in the RDU project. Percentage of time spent in the RDU role is significantly related to only one RDU agent scale. Agents who spent most of their time in the RDU role were more likely to perform the Program Change Expert role. RDU agents were asked how they saw themselves in relation to the three main groups they worked with -- the RDU project, the host organization, and local sites -- by graphically indicating where they saw themselves in relation to each pair of groups. Agents who saw themselves as not belonging to either of the organizations in the project/host organization or the project/local site pairs were scored high on a Project Marginality scale. Agents who saw themselves as not belonging to either organization in the local site/host organization pair were scored high on a Local Marginality scale. (These two marginality measures are almost independent; r = .16.) Agents who scored higher in Project Marginality tended to play two roles significantly more often: Content Expert and Program Change Expert.** Although two corelations involving the Local Marginality measure are nearly as high, the variable Ns for available measures cause them not to be statistically significant. Finally, agents who reported higher levels of role conflict (e.g., extent to which agents reported that

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*More than 30 measures were correlated with these role and activity scales. Variables involving training measures or support from local site staff that were generally insignificant have been omitted.

**The more time the agent spent in RDU, the more marginal he or she felt (r = .60). Project marginality is also positively related to job satisfaction (r = .26) and negatively to agent's reported role conflict (r = -.31). Thus, agents who score high on this scale may avoid conflicts and find their jobs more satisfactory by not relating strongly to any of the organizations they must work with.

Table 13. Correlations Between RDU Role and Activity Scales and Other RDU Study Variables

RDU STUDY VARIABLES	ROLE SCALES			ACTIVITY SCALES			
	Coordinator	Content Expert	Change Expert	Boundary Spanning	Budget Management	Activities w/Teachers	Professional Development
Age	-.44*	.30*	-.17	-.28*	-.17	-.17	-.13
Years teaching	-.33*	.16	-.17	-.52*	-.17	-.17	.04
Percent time in RDU	.00	.02	.29*	.11	-.12	-.11	.06
Project marginality	.18	.34*	.29*	.19	.20	-.08	.14
Local marginality	.07	-.08	-.27	-.30	-.13	.05	.18
Reported role conflict	-.22	.06	.00	.27*	-.10	.11	.01
Change skills	.10	.20	.02	.18	.17	-.20	-.18
Communication skills	-.14	-.14	-.23	-.36*	-.24	-.24	.18
Use-of-power skills	-.10	-.11	-.35*	-.43*	-.10	-.24	.10
Appropriateness of amount of training	.09	-.36*	.14	.00	-.13	-.01	-.24
Project director's influence	-.06	.21	.23	.59*	-.13	.25*	.13
Project evaluator's influence	-.10	-.04	.26*	.28*	-.03	-.04	.05
Supervisor's influence	.28*	.23	.00	.43*	.00	.04	.39*
Site administrator's influence	.16	.09	.07	.44*	-.02	.26*	.13
Project director's support/interaction	-.04	.07	.31*	.49*	-.08	-.03	-.03
Project evaluator's support/interaction	.00	.08	.33*	.35*	-.32*	-.18	-.10
Supervisor's support/interaction	.14	.08	.26	.38*	-.09	.10	.26
Other field agent's interaction	-.05	-.03	.04	.21	.10	.07	.21
District administrator's support/interaction	.39*	-.35*	.10	.21	.01	.30*	.03
Site principal's support/interaction	.06	-.11	.11	-.14	.03	.10	-.12
Sense of efficacy	-.10	-.02	-.05	-.01	.00	-.28*	-.09
Job satisfaction	-.05	.34*	.09	-.01	.12	-.05	-.01
Perceived program success	.07	-.22	.11	.03	.03	-.02	.01
Perceived site performance	-.03	-.25	.03	-.27*	-.11	-.15	-.04

*Correlations significant at .05 level marked with asterisk; values differ due to variable N's.

people had different opinions about what or how they should be doing their jobs) were more likely to be frequently engaged in Boundary Spanning activities. Aside from these four significant correlations, there are no strong relationships between agent roles and activities and variables relating to their status in the RDU Project.

Skills and training. A factor analysis resulted in the grouping of 11 (out of 24) skill items into three skill scales: Change Skills, Communication Skills, and Effective Use-of-Power Skills. The Change Skills scale (e.g., self-rated skill in problem identification, solution selection, evaluation/follow-up) was not significantly related to any role or activity scale. The Communication Skills scale (i.e., listening and understanding, oral communication, interviewing, influencing thorugh confrontation and advocacy methods) displays negative correlations with most roles and activities, but the correlation is significant only for Boundary Spanning, that leads to the perhaps strange conclusion that those who more often performed Boundary Spanning activites saw themselves less skillful in communication. Effective-Use-of-Power Skills (i.e., gaining acceptance at all levels of the system, effective use of formal and informal power structure, openness to change) is also significantly negatively associated with Boundary Spanning.* Agents who reported that they performed Program Change Expert roles frequently tended not to perceive themselves as having strong Use-of-Power skills.

Among four measures of RDU training (Amount, Usefulness, Appropriateness of Amount, Timeliness), only one of these training measures showed a significant relation with any of the role or activity measures. Agents who performed the Content Expert role more often were much less satisfied with the adequacy of the amount of training they received.

The influence and support of others. The Influence that others had on the agent was measured by asking agents to rate the RDU project director, project evaluator, host organization supervisor, and school site administrator (principal), as well as others, using a four-point scale ("none" to "a great deal") on each of three dimensions (influence on your activities, influence on amount of time you allocate, how much feedback received about how you are performing your job), which were then summed to form a scale. The Support received from others was determined by asking agents to state the amount of interaction (face-to-face, telephone, written) they had with each person on a five-point scale (0 = "never" to 4 = "daily"). Ratings for the three modes of interaction were summed to obtain an interaction support measure for each person. Perhaps the most remarkable finding in this set of correlations of roles/activities with influence and support measures is that RDU agents who performed Boundary Spanning activities frequently were positively and significantly influenced and supported by virtually everyone. As we have seen, Boundary Spanner agents tended to be younger and less experienced (in teaching), reported greater role conflict in terms of different expectations others had of them, and, in their Boundary Spanning activities, spent more traveling time from site to site, meeting with small planning groups in the school, promoting or explaining the program, writing reports, preparing or delivering materials, and meeting with project staff. In a word, they were "doers." Consequently, we should expect that these agents would report much higher levels of interaction with others. It is also clear that this interaction produced substantial levels of perceived influence of those others on the agent.

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*We note, however, that the Communication Skills and Effective-Use-of-Power Skills scales are very highly intercorrelated (r = .86), and thus tend to display rather similar correlations with other variables. In fact, these two scales are so highly correlated that we are surprised that they were not combined into one scale: Communication and Use-of-Power. Viewing Communication Skills as very closely associated with Use-of-Power Skills may help to understand why the Communications Skills scale is negatively correlated with so many roles and activities.

Among the other activity scales, significant correlations are sparse. Agents who engaged in more activities with teachers reported greater influence by both the project director and the local site administrator. In addition, they reported more support/interactions with school district admiistrators. Agents who tended to engage in Budget Management activities were not influenced or supported significantly by anyone, except _negatively_ (i.e., relatively less interaction) with project evaluators.* Agents who engaged in more personal Professional Development activities reported higher influence by their own host agency supervisor. (This, by the way, is virtually the only significant correlation for the Professional Development variable aside from its low but significant, relation to the Coordinator role. See Table 12.)

Among the correlations involving the three role scales, Program Change Experts seemed more prone to influence by or interaction with the project director and the project evaluator. Recall that although agents playing the Change Expert role displayed more Project Marginality, they also tended to spend a greater portion of their total time working for the RDU project. Frequent interaction between agents and school district administrators is apparently much more likely for agents performing a Coordinator, rather than a Content Expert, role. We finally note that interaction/support from other agents and from site principals seems to have _no_ influence on any of these RDU agent roles or activities.

Agents' perceptions of outcomes. The last four rows in Table 13 report correlations between RDU agent roles/activities and four outcome measures. Sense of Efficacy was measured by asking each agent to judge his/ her importance to the accomplishments achieved at school sites during each of four phases (problem identification, solution selection, planning for implementation, implementation). The scores for the four phases were summed. The Job Satisfaction scale was the sum of ratings of two items (On the whole, to what extent are you satisfied with your job; to what extent [is it] true? [My job] uses my skills and abilities and lets me do the things I do best). Perceived Program Success reflected the degree to which RDU agents believed that four types of clients (district administrators, site principals, teachers on the planning team, teachers not on the teams) felt that the program achieved its objectives. The four ratings were summed to produce the Perceived Program Success measure. The Perceived Site Performance measure was derived by asking each agent to rate a randomly selected site they worked with on three dimensions (extent the selected solution solved the problem identified; extent the solution has been implemented and is likely to continue to be used; extent to which the problem-solving process has been incorporated); and also included a measure based on the extent to which the agent saw a difference in local site personnel knowledge and skills in effective problem solving at the beginning and near the end of the project. Perhaps the major finding with respect to these and other agent outcome measures is that the agent role and activities scales have very little relationship to these outcome measures. There are only three significant ($P < .05$) correlations out of 28 correlations (and at least one would be expected due to chance). Content Experts reported higher job satisfaction; Boundary Spanners perceived their sites as having performed less well; and RDU agents who engaged in more Activities With Teachers reported a lower sense of efficacy.

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*We suspect that this may, in part, be an artifact of differences among the seven RDU projects reflecting differences in project organization and operations.

The Abt researchers have thus provided us with some idea of the factors that may influence what linking agents do. Boundary Spanning agents, in particular, are influenced by the interpersonal relationship that they establish and maintain. To a much lesser degree, other agent roles and activities are sometimes affected by interpersonal relationships. Other factors influencing especially the Coordinator role and Boundary Spanning activities are the agent's age and years of teaching experience. Aside from Project Marginality, which related to two roles, status in the project, including percentage of time allocated to the RDU role, displayed much less influence than might have been expected. Self-reported skill levels and training also seemed to have little influence. Finally, although Section IV.D below will show that RDU agents' involvement positively and significantly affected successful school change, there is little evidence in Table 13 that specific agent roles or activities have a significant relationship with agents' sense of efficacy, job satisfaction, or perceptions of site performance or program success at a site.

5. RBS Local School Improvement Agents

Although only six agents were involved, the RBS Local School Improvement (LSI) study adds additional insight regarding school effects on agent roles. Summarized briefly, the RBS/LSI reports indicate that several school site factors, including scarce resources, interpersonal tensions, organizational instability, and staff expectations operated to force agents to expand their roles beyond the original technical roles assigned by RBS. Corbett (1981) identified five additional fuctions that were performed: expanding the process helping role, process adjusting, (re)endorsement seeking, mediating conflicts, and providing clerical services.

6. Summary and Commentary

What can we conclude from this wealth of data on linking agent work? Perhaps, first, that we can no longer complain about a lack of data! However, it is equally obvious that we sorely need much better instrumentation with which to measure appropriate dimensions of linking agent work.

Here are some technical observations. As we have seen, role labels, perhaps because of their ambiguity or perhaps because they indeed label relatively unrelated work clusters, tended to be generally weakly related to each other and thus provided a less-than-promising basis for creating multi-item scales with high internal consistency coefficients. Consequently, the scales derived from role items are not highly reliable, a fact which, in turn, tends to attenuate the correlations of these scales with other measures. This may explain much of the lack of strong relationships among work roles and between work roles and other measures. Activity-level items tended to work better, perhaps for two major reasons. Usually more items were written, and typically a larger number of related items appeared in the same instrument. As a result, the factor analyses based on activity items extracted more of the total variance, and there were usually more items in a scale.

Finally, given more items and higher correlations among items in the same scale, higher internal consistency coefficients result. This, in turn, serves to reduce attenuation of correlation between scales. Note, for instance, the unusually impressive list of significant correlations (in Table 13) where a six-item Boundary Spanning activity scale was involved. Multiple item scales perhaps serve another useful purpose. They help to clarify, sometimes for the respondent, but certainly for the researcher and the reader, what the scale measures. Consider the one-item RDU scale, Generalist-Coordinator, whose one item is "a coordinator"; or the one-item RBS/ESA measure, Monitor, whose one item is "Monitor who identifies discrepancies between regulations and practices." If either of these scales had even a few other items, we might have a much clearer impression of what the scale measured.

Perhaps a final technical quibble concerns labeling and interpretation. This problem is perhaps best seen in the NTS analysis, where first the original Butler and Paisley linking agent function labels were sometimes grossly simplified or misinterpreted in the writing of item examples (e.g., communication items dealt only with communication with clients; only one "process helper" item was created), and then the factors derived from these items were given overly broad labels (e.g., resource finder is concerned almost entirely with information resources; the communication factor is concerned only with client communication). This problem also appears in other studies. For example, in the RBS/ESA study, the two-item factor scale ("Expert on a curriculum area"; "Workshop Presenter") became abbreviated to "Expert/Trainer" and then in other places to simply "Trainer," and thus the Curriculum Expert concept faded away (despite the fact that this role had the highest loading on the "Expert/Trainer" factor). Even the DESSI study that we so admired had its factor labeling problems. The Cox and Havelock "Support of Teacher" factor appears to include three items that refer to building or maintaining support among school personnel. Most school personnel, of course, are teachers; but are all school personnel teachers? So let the reader beware! Scale and factor labels may not accurately or precisely convey their content.

Turning to substantive matters, what may we conclude? Perhaps, first, that comparisons among studies are perhaps more easily made in terms of differences in descriptions of linking agent work rather than in similarities. Yes, all were linking agents, but they played quite different roles!

As we have seen, most of the State Dissemination Grants Program agents were school- or district-based, and the majority confined their work to "spread" or "exchange" roles rather than assisting their local clients in "choice" or "implementation." A great majority appeared to play combinations of versions of two of Butler and Paisley modal role specializations: [information] resource finder and generalist linking agent, "scout." A few of these agents, probably mainly those located in SEAs or ESAs, apparently tended to move from these primary roles toward the process helper or solution giver roles, but the instrumentation was too fuzzy to distinguish between these two modal roles. We are thus left with a relatively well-defined "Facilitator" role whose items bear only distant resemblances to either a strong Process Helper or a strong Solution Giver role. According to the NTS typology, only two of the 136 agents were classified as playing a pure Facilitator role, and only three combined the Facilitator/Resource Finder roles. However, 27 agents combined the Facilitator/Communicator roles, and many of the agents (44 of 136) were "eclectics" who gave roughly equal emphases to all three NTS roles. We concluded that the three NTS factors describe the major subdimensions of an essentially Information Resource Finder/Client Communicator role. Given the generally large numbers of clients to be served (large scope), the relatively small amount of time that agents could work with individual clients (low intensity), and the probably limited breadth and depth of expertise vis-a-vis client needs, few of the SDGP agents were able to carry out more than an Information Use Assistance Strategy. Their entitlement was quite limited. Unfortunately, the NTS study does not provide much information concerning differences in agent behavior according to the type of "host organization," so we are unable to confirm hypotheses concerning possible agent role differences by type of organization that are strongly suggested by the data presented in Table 1.

When we turn to the Educational Service Agencies, we discover that nearly half of all our data describes linking agents who worked in these agencies. We see that their work was significantly affected both by the type of ESA (e.g., compliance-oriented or service-oriented) and by the nature of their sponsorship or entitlement. ESA-based agents associated with the SDGP apparently performed primarily information use assistance work. Those associated with NDN or RDU were very heavily involved in Solution Giver roles, sometimes with overlays of Process Helper roles, but they rarely played Resource Finder roles, except to find other human resources who could provide training or other specific forms of technical assistance. However, when the agents worked for their own agency (rather than for or with federally funded programs such as SDGP, NDN, or RDU), the type of agency dominated agent role behavior; i.e., the New Jersey County Office agents rarely played a strong [Curriculum] Expert/Trainer role, and, with a few exceptions, New Jersey EIC agents and Pennsylvania IU agents rarely played a strong Monitoring role. However, the Liaison role, which was played more frequently than either of the other two roles, was not differentiated by type of ESA agency. The RBS typology (see Table 7) indicates that 39% of these ESA agents played some type of role in which Liaison activities were quite frequently performed.

The RBS/ESA study thus provides us with at least three versions of essentially Technical Assistance Strategy roles--the Liaison role appears to be similar to the Butler and Paisley Generalist (Communicator) role and may be related to the RDU study "Generalist-Coordinator" role. The [Curriculum] Expert/Trainer role is a clearly but perhaps circumscribed variant of the Butler and Paisley Solution Giver role. However, the RBS Monitor role involves an entirely new dimension that is mapped not at all in the Havelock-Piele-Butler and Paisley conceptualizations. The reason, of course, is clear, as Firestone and Wilson (1981, 1982) noted. Enforcement is a fundamentally different type of strategy than the rational, knowledge-use, assistance strategies employed in all of other programs and projects covered in this synthesis.*

Almost all the DESSI, RDU, and RBS/ LSI agents were obviously Solution Givers in the modal sense, but all combined problem-solving process help with specific program implementation assistance. Here we perceive at least three submodalities:

1. The NDN and state IV-C dissemination agents who, according to Cox and Havelock (1982, p. 8), spent more than one-fourth their time in initiating relationships (e.g., holding awareness conferences, distributing flyers, etc.). These agents were much more concerned with promoting awareness and identifying prospective adopters. Also, they apparently were much less concerned with encouraging clients to engage

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*Guba (1967, 1968) was among the first writers in the field of educational dissemination to note that at least eight primary change strategies might be employed, depending on whether clients were viewed as: (1) value-oriented, (2) rational, (3) untrained, (4) psychologically oriented (who could be persuaded or conditioned), (5) economically oriented (who could be rewarded or deprived), (6) political (who could be influenced through power, conflict, and compromise), (7) Bureaucratic (who could be compelled), or (8) professionally oriented (who could be obligated). Zaltman, Florio, and Sikorski (1977) identified three basic change strategies: power strategies, manipulative strategies, and rational strategies. The enforcement strategies followed (primarily) by the New Jersey County Office agents are obviously power strategies, since they involve the threat or use of reward and punishments. In the Guba typology, they fall closest to the Bureaucratic clients who can be compelled. Note that, by design, threat of enforcement may create motivation for New Jersey schools to turn to the EICs for other forms of technical assistance. The final point to note echoes Karen Louis in her observation that most research on linking agents has been narrowly focused. However, linking agents, by definition and in actual practice, use fundamentally rational strategy. We should not forget that there are other strategies, but we should also not be surprized if distinctly and fundamentally different strategies also entail distinctly different agent behavior.

in extensive problem definition and solution search processes than were the RDU or RBS/LSI agents. Compared to RDU or LSI agents, these DESSI agents generally were confronted with the need to deal with more clients (higher scope) and thus were not usually able to provide as much intensive, on-site assistance (lower intensity).

2. The complete Problem-Solving Process/Solution Giver Generalists. In terms of strategy and tactics, the LSI agent is best seen as a variant, or certainly a derivative of the generic RDU approach. All seven RDU project agents and the LSI agents were heavily committed to a systematic problem-solving process approach, which sought to link school problems with potential R&D-based solutions. These were low scope, high intensity agents, who performed many roles.

3. The Consultant/Trainer Specialists. These were the DESSI study local IV-C agents. The RDU program also made extensive use of specialists, as noted in Section II.B. and again in Section III.C.; however, these agents were not studied in much detail. We have only the brief information provided by Cox and Havelock (1982) concerning local IV-C agents, and that provided by Firestone and Wilson (January 1982; June 1982), concerning the ESA [Curriculum] Expert/Trainers. The DESSI data indicated that these consultant trainers were most heavily involved in providing training and technical assistance during implementation, in conducting evaluations, and in providing training or assistance in teacher adoption preparation.

With the exception of the sometimes highly specialized work performed by specialists in the third group (e.g., conducting evaluations), most of these linking agents engaged in a very broad range of roles and activities. Between the DESSI and the RDU studies, 14 work factors were identified, whereas only three factors were identified in each of the SDGP or RBS/ESA studies.

The complete set of factor analysis factor labels are listed in Table 14.

In an effort to make some sense out of the serial list of factors presented in Table 14, we went back to review the items that loaded on each factor. On the basis of this review, we offer Table 15 as our effort to synthesize these factor analysis results. Our interpretation suggests that perhaps six highly generic clusters are represented in the results of these studies.

The first cluster is represented by activities and roles which are concerned with general communication, liaison, coordination, and boundary-spanning. We see the DESSI Awareness Initiation factor as a highly specialized, but sometimes extremely important, aspect of this more general role. This role/activity cluster may be compared with Havelock's "Catalyst" or Butler and Paisley's Generalist/Scout (see Figure 3).

The second cluster is the resource finder. It is represented in the NTS study with a strong sense of retrieving information resources. The RBS Liaison factor contained three items, one of which was resource finder,

Table 14. Strategies and Associated Linking Agent Work Factors

STRATEGY	STUDY	LINKING AGENTS WORK FACTOR	
I. Information Use Assistance	NTS/SDGP	(Functions)	1. Communicator [with clients]
			2. [Information] Resource Finder
			3. [Knowledge use] Facilitator
II. Technical Assistance	RBS/ESA	(Roles)	1. Liaison [planner, coordinator]
			2. [Curriculum] Expert/Trainer
			3. Monitor
III. Problem-Solving/ Program Implementation	DESSI	(Pre-implementation activities)	1. Awareness Initiation
			2. Administrator Adoption Preparation
			3. Teacher Adaption Preparation
			4. Support of Teachers [and others]
		(Post-implementation activities)	5. Implementation Specifics
			6. Evaluation
			7. Continuation/Diffusion
	Abt/RDU	(Roles)	1. Generalist-Coordinator
			2. Program Change Expert
			3. Content Expert
		(Activities)	1. Boundary Spanning
			2. Activities with Teachers
			3. Budget Management
			4. [Personal] Professional Development

Table 15. Strategies and Associated Linking Agent Work Factors (Tactics) Grouped in Terms of Similarity of Work Performed

INFORMATION USE ASSISTANCE (NTS) STRATEGIES	TECHNICAL ASSISTANCE (RBS/ESA) STRATEGIES	PROBLEM-SOLVING/ PROGRAM IMPLEMENTATION STRATEGIES
1. Communicator	Liaison [Coordinator, Needs Assessor/Planner]	Generalist-Coordinator (RDU Role) ● Boundary-Spanning (RDU) ● Awareness Initiation (DESSI)
2. [Information] Resource Finder	Liaison [Resource Finder]	[performed by other specialists in the programs]
3. Facilitator [Diffuse KU by Individuals]		
4.	[Curriculum] Expert Trainer	Content Specialist (RDU Role) ● Implementation Specifics
5. Facilitator [assist clients to install a new procedure]		Program Change Expert (RDU Role) ● Administrator for Adoption Preparation (DESSI) ● Teacher Adoption Preparation (DESSI) ● Support of Teachers (DESSI) ● Activities with Teacher (RDU) ● Evaluation (DESSI) ● Continuation Diffusion (DESSI)
6.		[Miscellaneous] ● Budget Management (RDU) ● [Personal] Professional Development (RDU)
7.	Monitor	[Evaluation?? (DESSI)]

hence this factor is spread between the first two major work clusters. In the various programs employing Problem-Solving/Program Implementation Tactics (DESSI, RDU, LSI), technical resource finding was typically performed by others.*

We have placed the NTS [Knowledge Use] Facilitator in a separate cluster. To some degree it bears a resemblance to the next two clusters, but this resemblance depends more on the factor label than the item content. Among the four items in this scale (Planning, Influencing, Producing, Implementing), only one -- "Implementing--assisting clients to install a new procedure" -- begins to suggest a more intensive form of assistance or implementation. We recall that in Section II-B, Michael Fullan made a distinction between knowledge utilization (KU) that refered to use of specific projects or programs and KU that refered to more diffuse use. He also distinguished between KU by individual users and KU by groups of users such as a school. These two distinctions made by Fullan are particularly useful here. We are suggesting that the NTS Facilitator cluster best described the linking agent work that is concerned primarily with the use of diffuse forms of knowledge (e.g., facts, concepts, ideas, curriculum materials, teachers' guides, speeches, reports) by individuals. This type of assistance appears to call for a set of linking agent tactics different from those employed when more specific KU (e.g., program adoption/implementation) is attempted or when groups rather than individuals are the clients.

These latter KU objectives characterize the fourth and fifth clusters, which differ immensely in the breadth versus depth of agent expertise required. The fourth cluster combines perhaps three associated roles: Curriculum Expert (in some areas such as reading, bilingual education, career education), Workshop Presenter/Trainer, and Technical Assistant. Some variant of this set of activities was found in three of the four studies. It appeared as the [curriculum] Expert/Trainer in the RBS/ESA study, as the Content Expert role in the RDU study, and as the Implementation Specifics factor in the DESSI study.

Factors in the fifth work cluster are primarily found in programs that involved Problem-Solving/Program-Implementation strategies. The RDU study identified the role generically as a Program Change Expert. Also, the NTS study included one item, Facilitator--assist clients to install a new procedure. The DESSI study factor analysis unpacked this role into at least five components.** Note that, although we have grouped all these

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* The NDN Technical Assistance Base contractors did much of the resource finding, cataloguing of JDRP approved programs, and provision of training and technical assistance for NDN SFs and D/Ds. In RDU, each project employed information and training specialists; in LSI, the program developers at RBS played the resources-finding role. Some of the agents in the programs did look for human resources, but this type of activity was not explicitly identified in any of the items. Implicitly, it tended to be subsumed under boundary spanning, liaison, or coordination.

**The DESSI Implementation Specific Component was placed in the fourth work cluster. A seventh DESSI component, Awareness Initiation, simply wasn't a large part of RDU agent work. Although it was an important first step in program implementation, especially for NDN agents, we have placed this component in the first work cluster with communication, liaison, coordination, and boundary spanning activities.

these components under this one generic role, each emerged as a fairly independent and distinguishable factor.

The sixth cluster is a miscellaneous "catch-all" in which we have placed two RDU activity factors: Budget Management and [Personal] Professional Development. We recall that Cox and Havelock found that, in their study of DESSI agents, the sample as a whole spent only a little more than half their time with clients, and that the other half was "spent on routine maintenance tasks associated with their roles (administration, professional development, travel, and in-house product development)" (Cox and Havelock, 1982, p. 7). Because these types of activities did not deal directly with clients, they weren't considered in the DESSI analysis. The RDU study included several items of this type (e.g., writing reports/filling out forms; traveling from site to site), but the two factors listed in Table 15 are the only factors that emerged. This sixth cluster stands as a now nearly empty place-holder for a broad array of administrative, financial, maintenance, housekeeping, self-development, and other functions that have been largely ignored in the analysis of linking agent work.

At the bottom of the tables we have placed the one RBS/ESA Monitor factor. As we have noted elsewhere, we question whether this one-item factor, at least in its pure form, belongs within the set of "rational" strategies listed in Table 15. However, Firestone and Wilson made it clear that many monitor agents did blend Monitoring with Liaison or (curriculum) Expert/Trainer roles.* As we have indicated in Table 15, perhaps its closest, but still distant, counterpart would be the Evaluation factor found in the DESSI study. Had the NTS study used the full set of 15 Butler and Paisley items, we might have also found some distant counterpart to the highly generic concept of monitoring/evaluation in the left hand bottom row of Table 15. Unfortunately, the NTS study omitted the two perhaps relevant functions, Monitoring Products and Evaluating. "Monitoring Ideas"--keeping abreast of recent education practices and innovation--was included. However, this is much more of a professional awareness or vigilance-type item.

This item, by the way, was one of two items; the other was "Intervening-Proactively seeking clients needs" which displayed appreciable loadings on all three NTS factors. Other analyses also found "multifactor" items that loaded, to an appreciable extent, on two or more factors and thus were not included in any scale. Examples are the RBS/ESA Proposal Writer role which loaded in the .4 range on both the [curriculum] Expert/ Trainer and the Monitor factors. In the DESSI study, "putting out fires" and "assessing needs" were two multifactor items. We suspect that the Abt researchers also found such items, but none were reported. Although items of this type tend to get lost when creating item scales, we need to attend to them more closely when looking at the meaning of the factors, as contrasted to the item scales created by using the factor analysis results as a guide to item clustering. For example, assessing needs or monitoring ideas are undoubtedly important parts of several work clusters. Eliminating the effect of such items in creating derived measures is unnecessary and perhaps unwise.*

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*Their typology (see Table 7) indicates that the combined percentage of "Monitor-Trainer," "Monitor-Liaison," and "Monitor-Trainer-Liaison" types (17%) exceeded the percentages of the "Monitor Only" type (14%).

Perhaps our final reminder with respect to linking agent work clusters is that some of these analyses simply "lost" items. In instances such as the DESSI library and computer search item or the RBS/ESA curriculum designer or group process trainer items, that occured it was because very few agents performed this type of work. However, in other cases, even among high-frequency items, it simply happened that only one item was present in the list to represent a perhaps distinctly different type of linking agent activity. With no other related items, the potential "factor" was lost because it was inadequately defined. Examples are the RBS/ESA "on-call consultant," the NTS "managing conflict--helping others resolve discord," or the RDU role items, "Resource Person," "Process Trainer," "Observer/Historian," "Counselor or 'Hand-Holder'," and "Conflict Resolver." It is perhaps truly remarkable that NTS dropped its Managing Conflict item, Abt dropped its Conflict Resolver item, and DESSI omitted its Putting Out Fires item (because it loaded on several factors). This comment leads to a last question: Where is the modal "Process Helper" role defined in Table 15? Is it implicitly part of the fifth work cluster? Or is this fifth cluster a definition of the "Solution Giver?" Or is it both? Our answer to this question is to note the label of the strategy under which nearly all the factors pertaining to this fifth work cluster are located. It is a strategy that combines Problem Solving Process Assistance with Program Implementation (Solution Giving) Assistance.

We failed to find a true process helper for two reasons. First, and primarily, because none of the dissemination programs that were studied employed anything approaching a pure process helper strategy. We must look to the Organizational Development (OD) literature to find agents in this type of role (see Schmuck and Miles, 1971; Miles, Fullan & Taylor, 1978; Miles, Sullivan, Gold, Taylor, Sieber & Wilder, 1978; Fullan, Miles & Taylor, 1980). Second, as we have seen, too few items were included in the instruments of these various studies to clearly identify such a factor, even if some of the agents performed this modal role to some extent. In the NDN, RDU, and LSI efforts, process was important in both its technical and its interpersonal forms. However, as illustrated in Corbett's (1981) discussion of the "Mediating" roles that emerged as LSI agents attempted to maintain relationships with schools in order to carry out their technical roles, processing helping was nearly always instrumental for accomplishing what was primarily a highly focused and reasonably sophisticated form of technical, problem-solving process-oriented Solution Giving.

One final point must be made as we attempt to reconcile these findings with the Havelock, Piele, Butler-Paisley theoretical conceptions of linking agent roles. It is simply that, with the exception of the pronounced lack of a greater prominance of the Process Helper role, the factors listed in the right-hand column of Table 15 may, in fact, represent our closest empirically based approximation to the "Superlinker" role (see Figure 3). In 1978, Hood and Cates referred to this role as a theoretical construct, and perhaps as a worthy goal, but an "impossible dream" for all but a few agents who have acquired the requisite depth of training and experience and have stayed alive (funded) and committed. The "Superlinker" may remain an elusive role for any one person in reality. But the combination of SF and D/D agents in the NDN program and the combination of project resource specialists, field agent "facilitating/generalists," and training specialists that were employed in many of the RDU projects indicate that the practical alternative to the "superlinker," through the articulation of differentiated roles (see Butler & Paisley, 1978, pp. 41-43), has already been achieved and is now documented in at least one version.

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*Given the ease of computing factor scores for each subject on most computer factor analysis programs, it is somewhat surprising that none of these studies employed factor scores, as contrasted to item scales, in their analyses. Factor scores would often have preserved more complete measurement of the underlying trait. They would also have reduced interscore correlations to zero (with principal component factor analyses followed by varimax rotations), increased the reliabilities of the measures, and reduced the attenuation of correlations with other variables.

D. Linking Agent Effects and Outcomes

1. The NTS and RBS Study Findings

The NTS Study of State Dissemination Grants Program (SDGP) explicitly excluded examination of the effects of SDGP agents on clients.* The RBS Study of Educational Service Agencies (ESA) was still in progress when this section was prepared. Through telephone conversations with the RBS researchers, we learned that they are preparing a report describing benefits, as perceived by an informant in each of 68 LEAs, accruing to the LEA as a result of working with an ESA. Much, but not all, of their data on perceived benefits deals with the ESA agency as agent (see the Karen Louis discussion of agencies as agents in Section II.B.) rather than specific ESA personnel as agents. The RBS researchers did not believe that they would be able to associate the different linker types (trainer, monitor, liaison, and combinations) with LEA benefits because of the number of agents dealing with each LEA, but they would possibly be able to associate agency types with benefits.**

The RBS Local School Improvement findings, reported in Firestone and Corbett (1981), were confined primarily to examination of two intermediate outcome measures: (1) the local school team's progress through the steps of the RBS component approaches, and (2) the team's sense of ownership.*** These two outcomes were related to (a) school factors (central office support; principal's problem-solving motivation; teachers' problem solving motivation), (b) agency-school relationship (RBS-school tension), and (c) linker behavior (frequency of contact with sites; range of site personnel contacted). The data were based on a study of 11 teams (one team included three schools).

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* For outcome data on the effect of agents employing the Information Use Assistance Strategies, one must turn to the study of the effects of the seven agents in the Pilot State Dissemination Program (Sieber, Louis & Metzger, 1972; Louis & Sieber, 1979) or to occasional evaluations performed by individual SDGP projects.

**The RBS researchers said that their preliminary analysis of benefits suggested that there were two major classes: (1) benefits that enabled the LEA to better deal with its external environment (e.g., understanding and complying with state and federal law; assistance in presenting issues to school boards; help in planning community relations programs); and (2) benefits that improved internal LEA organization and instruction (e.g., improved administrator skills, better organization and use of school support services, cooperative arrangements that produced economies of scale, and many different benefits for instruction, including help in planning and evaluation of new programs, assistance in implementation and articulation of major curriculum changes, improved teacher skills, improved student test socres, increased staff morale, and improved student attitudes).

***A third outcome, continuation of LSI changes and several additional measures of local conditions are described in Corbett, Dawson, and Firestone, 1982. This report suggests that local conditions are the primary factors affecting continuations; no data associating linker behavior or agency-school relationships to continuation are presented.

Team progress. Five of the 11 teams were rated as going through the RBS school improvement steps well, as judged by three criteria (timeliness of the process; the team's understanding of the approach; and the team's ability to apply the approach to its own problems). Five of the teams went through the steps moderately well. One team was rated as poor.

There was no relationship between frequency of linker contact and the team's progress. There also was no relationship between the range of linker contacts at the site and the team's progress. However, there was an almost perfect negative relationship between RBS-team tension and progress (only one off-diagonal case in the bivariate scatter plot). The central office support measure also displayed a perfect correlation, but this relationship was positive. Moreover, both the teachers' and principal's problem-solving motivations were positively associated with team progress, but the relationship was statistically significant only for the correlation involving teacher motivation ($r = .66$).*

Team's sense of ownership. The findings for the sense of ownership outcome variable are almost identical to those found for team progress. Frequency of linker contact and range of linker contact showed virtually zero correlations with team's sense of ownership. RBS-team tension was strongly and significantly negatively related (- .78) to ownership. Teacher problem-solving motivation was strongly and significantly positively related to team ownership (.67), as was central office support ($r = .78$); Principal problem-solving motivation displayed an appreciably lower relationship ($r = .35$).

We see that tensions between the RBS development component personnel and the site strongly inhibited the team's progress and diminished its sense of ownership. Firestone and Corbett note that linkers were helpful here precisely because they could act as mediators between the RBS development staffs and the school sites, and that linkers' skills in mediating, both between RBS and the sites and among individuals or group within sites, were perhaps their most useful roles. However, the school factors had a substantial impact on the outcome measures. There was a perfect positive relationship (no off-diagonal cases) between school district central office support (note that these were the "internal" linking agents) and team progress. Central office support also shows a strong relation to team's sense of ownership ($r = .78$). The teacher's problem-solving motivation also positively and significantly affected both team progress and sense of ownership. Although positive in direction, the principal's problem-solving motivation showed no significant association with either outcome measure. Regarding these findings, Firestone and Corbett concluded:

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*Both variables were based on three-point scales. Correction for the use of widespread categories would raise the correlation. However, the uncorrected correlation is significant even with N = 11, since the critical value for a one-tail test that the correlation is not zero is .521. Firestone and Corbett (1981) displayed scatter plots for the variables, but reported no measure of association nor significance tests of the associations. We have computed the product momement correlations to make these results comparable to those reported in the other studies.

> The above findings suggest that there were no linker behaviors that had as uniform an effect on the outcomes of team deliberations as the team's own motivation and the support of central office staff. Moreover, as already discussed, linker behaviors were often responses to local conditions rather than proactive interventions.
>
> Linkers were useful . . . They mediated between the elements of the approaches that were designed in an external agency and the conditions and beliefs current at the school. They were crucial for navigating the hazards of a particular site and assuring that the [RBS] approach was of some use. (op. cit., pp. 14, 25)

2. The DESSI and Linking R&D With Schools Outcome Models

Although the RBS studies now available provide only limited information on linking agent effects, quite the opposite is true for the DESSI and Linking R&D With Schools (RDU) studies. Both provide extensive findings. A remarkable aspect of both studies is that they employed two levels of analysis, one focusing on the effects of linking agents on individuals and the other examining effects of agents on schools as organizations. Moreover, both studies examined the effects of linking agents in the context of a much wider set of other influencing factors and in terms of multiple measures of outcomes. The results in both studies are thus complex, but highly informative. Technically, both studies encountered serious problems with missing data for various measures that sometimes appreciably reduced the number of cases on which relationships could be measured; however, despite these problems, many significant relationships were established.*

The methods of analysis in the two studies differed. In the Abt study of RDU projects, the results were reported as zero-order product moment correlations among variables, and in terms of linear regression coefficients and multiple correlations, in which sets of predictor variables were regressed (either as a set, or with step-wise entry) against selected criteria.** The DESSI team also began with correlation of variables (as yet unreported) and it appears that they employed regression models that produced multiple correlation estimates for the effect of selected predictor measures on selected criteria in their individual effects models. However they employed structural equation models involving path coefficients to estimate and test for significance of relationships among predictors and criterion variables in their school-focused model.* Although we have fairly complete reporting of results, including tables of correlations and regression coefficients for the RDU study, the DESSI results are based entirely on AERA Annual Meeting presentation papers which depict only the final models, report the multiple correlations, and identify the statistically significant regression or path coefficients, but do not report their values.

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* For complete technical descriptions of these problems and their solutions, see A. M. Huberman and D. P. Crandall, "Fitting Words to Numbers--Multisite Multimethod Research in Education Dissemination" (regarding DESSI) and K. S. Louis, "Sociologist as Sleuth--Integrating Methods in the RDU Study," both in American Behavioral Scientist, Vol. 26(1), September-October, 1982.

**As we have noted previously, connonical correlation analysis was also employed by the Abt researchers to test for relationships between multiple predictors and multiple criteria.

When the two studies are examined more closely, we find that each study produced at least three levels or types of data relationship models, but there are problems in making comparisons. The Abt study of RDU reported outcome effects in terms of:

1. Effects of the RDU program on individuals.
2. Effects of RDU on school-level Knowledge Utilization/Implementation (i.e., scope of solution adoption and implementation, degree of product incorporation, and degree of problem resolution).
3. Effects of RDU on school-level School Improvement/Capacity Building (i.e., staff development and development of organizational problem-solving capacity).

The DESSI study also presents results for three different data models:

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*Although a gross oversimplification, the primary difference between these two approaches lies in the fact that the exact model of the relationship among all variables, predictors and criteria must be specified in a structural equation analysis, whereas no specification (other than selecting the set of variables, deciding on the order they are to enter the regression solution, and decing when to stop entering or removing variables) is required in multiple regression analysis. Multiple regression results produce estimates of the joint, direct effect of all predictor variables involved in the regression solution. However, structural equation models may specify relatively complex relationships of effects of variables along both direct and indirect paths (expressed as path coefficients) to other variables. For example, A, B, and C may affect D, but ony B and C directly affect D, and the effect of A is only thorugh B's effect on D (the direct, indirect, and combined effects of all three variables on D may be estimated). Structural equation models thus may produce far more specific and interpretable analyses if relationships among variables are at all complex. However, the use of more than two or three predictor variables in either approach can often lead to very particular results. The values of the regression coefficients or of the path coefficients may be greatly altered if even one variable is added or deleted. With small-size samples, the results may not be very reliable (replicable).

1. An individually focused model for effects on individual teachers for whom the innovation implementation required a minor change in their instructional procedures;

2. An individually focused model for effects on individual teachers for whom the innovation implementation required a major change in their instructional procedures; and

3. A school-focused model of outcomes.

It should be noted that the first type of Abt/RDU finding and the first two DESSI models treated individuals as the unit of analysis, whereas the second and third type of Abt/RDU findings, but only the third DESSI model treated the school as the unit of analysis. The DESSI School-Focused model combined all school-level predictors and outcomes in one complex model. The perhaps remarkable aspect of this model is that two fairly independent patterns of relations among variables were depicted. One related predictors to instruction and practice-related mastery by teachers, perceived personal benefits for teachers and others, and problem resolution. A second pattern related predictors to organizational change benefits and institutionalization of the practice. At first, we thought that these two patterns might correspond, at least roughly, to the two Abt/RDU school-level models for KU/implementation and school improvement/capacity building. There is a relationship, but it is not simple. Fundamentally, both the patterns in the DESSI school-focused model are perhaps best seen as an elaboration of the Abt/RDU KU/Implementation model, since this later model was concerned with scope of implementation, product incorporation (institutionalization), and resolution of the problem. However, at least some components of the two major outcomes appearing in the Abt/RDU School Improvement/Capacity Building Model, which focused on organizational development and staff development outcomes, are found in the DESSI model, but they were split between the two patterns.* However, the systematic problem-solving process incorporation aspect of organizational development outcomes, which was a significant aspect in RDU, was represented in DESSI not as an outcome, but only as a single contextual variable.*

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*Staff development benefits, as defined in the RDU study, appeared as personal gains/losses associated with the practice-related part of the DESSI model. Organizational change, which affected more than individual teachers or students, i.e., organizational development benefits as defined in the RDU study, were the "organizational change" benefits variable in the organizational change and institutionalization part of the DESSI model. The distribution of these organizational change benefits as reported by 104 DESSI study school principals included changes in the following categories: instructional methods (29%); staff socio-emotional state (22%); external communication (18%); staff skills (16%); materials (11%); plans/schedules/organization (10%); communication (9%); increased staff (8%); and assessment (7%) (Cox & Havelock, 1981, p. 16).

Moreover, there was a major difference in the emphasis on individuals as units of analysis and schools as units of analysis in the two studies. In the Abt/RDU study, the treatment of individual data was relatively brief; most of the analysis focused on the school-level analysis. Virtually the reverse was true of the DESSI analysis. Why this difference? We believe that it was not due solely to (real) disciplinary and methodological biases of the researchers, but also to fundamental differences between the programs they were studying and the types of questions they were attempting to answer. By design, the RDU Program was concerned with creating problem-solving teams at schools who would, with external asistance, undertake a relatively well-defined, team-based, problem-solving process, leading to the definition of a major problem, to search for and selection of an appropriate solution, and then to planning for, and actual implementation of, the selected solution. These solutions often were major curriculum changes involving many--perhaps all--teachers at several grade levels. Hence, the problem-solving/implementation team was the decision-making and action unit, and schools as organizations were the direct beneficiaries. The Abt researchers looked at individual responses of teachers and school principals, but quickly turned to aggregating teacher responses and scaling variables to proceed with school-level analyses.

DESSI proceeded from a far different set of program assumptions. In all four programs (NDN, state IV-C, local IV-C, and BEH), individual teachers could, in fact, be the program adopters (or developers in the case of local IV-C projects). There was no specific requirement in any of these dissemination programs that planning implementation teams be formed or that adopters engage in extensive team-based problem-solving processes. Team formation might happen because the specific characteristics of a selected innovation, but it would be atypical. Hence, understanding the factors that affect an individual teacher's implementation of new curricular or instructional practices and the benefits that thus derived, became the primary concern of the DESSI researchers. Indeed, they stated, "Our Study began with the belief that teachers were central" (Crandall, Bauchner, Loucks & Schmidt, 1982). Though their main concern lay with understanding implementation and outcomes at the individual teacher level, the DESSI researchers recognized that longlasting effects would be achieved only if the implementation efforts went beyond individual classrooms; hence they also created a complementary school-focused model to explore the factors influencing organizational change (nonindividual benefits, plans for continuation, and institutionalization).

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*Defined as Proactive problem-solving, i.e., "the conduciveness of the environment to problem-solving, as indicated by the extent to which faculty agree that procedures exist for dealing with problems, that decisions are made by people possessing adequate and accurate information, and that decisions, once made, carry clear action implications." This variable displayed a path coefficient of borderline significance (P-level between .05 and .10), as an antecedent to a measure of help received from the principal, which in turn is marginally antecedent to practice-related mastery.

We thus see that, although both studies examined both individual and organizational level outcomes, their emphases were substantially different, because the dissemination programs they were studying were different.

3. Other Differences Between the RDU and DESSI Studies

There are two other nontrivial differences between RDU and DESSI that should be noted. The DESSI study selected school sites that were known adopters of the programs being studied. This selection has two implcations. First, with the exception of local IV-C sites, all the innovations studied were, by definition, "validated" (either by JDRP, in the case of NDN; by BEH for its products; or by state-run IVD processes for state IV-C projects). Second, data concerning sites was usually obtained only late in the innovation/implementation stage. Moreover, with the exception of 12 DESSI case study sites, data concerning sites were obtained primarily during one short visit to each site. In the RDU study, sites were selected before adoptions took place. Indeed, in virtually all cases, sites were encouraged to undertake extensive problem definition effort before selecting a solution (although not all did so). Also, in many cases the selected solution was neither an R&D based nor a practitioner-developed and validated product.* Hence, although the RDU program encouraged schools to adopt R&D-based or validated practitioner-developed products, the data on product quality characteristics were far more variable (and extensive) than those for DESSI. Finally, the RDU data were much more longitudinal in character than most of the DESSI data. For at least the 90 RDU Consolidated Coding Form sites, there were a series of project records, linking agent contact reports, site progress reports, project evaluation reports, case study site visit reports, and survey questionnaire data that covered as much as two or three years of the RDU site history. Therefore, the RDU study findings were substantially more longitudinal, process-oriented, and organizationally oriented (rather than individually oriented), and they provided substantially more "fine-grain" information about context, product, process, and linking agent characteristics and the interrelations of variables than is currently available from the informal, interim DESSI reports.

With all these differences, is there anything that can be compared? We think so.

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*See Yin, Gwaltney, and Louis (1980), who reported that, by the Spring of 1979, nearly three years after the initiation of RDU and as much as two school years into the program for some sites, as many as 62 percent of the 194 adoptions they had identified were not known to have been validated; eight percent were validated NIE catalog products; and 24 percent were validated NDN catalog products. The remaining products were locally validated.

4. A Comparison of Significant RDU and DESSI Findings

Given the complexity and detail of the findings of the two studies, a complete comparison of many specific models and findings would be difficult, if not tedious and bewildering. We shall therefore confine this section to a brief summary of the most significant findings of both studies.

Significant RDU study findings. The Abt researchers distilled their conclusions to the following points:*

- The RDU projects created two types of outcomes: Knowledge Utilization/Implementation and School Improvement/Capacity Building.
- Engaging in a broad knowledge utilization activity is one of the most effective means of building capacity.
- Good products produced good school outcomes. Validated products tend to require more extensive individual change. Products that were perceived by staff to be of high quality and relevant to their needs positively affected major knowledge-use outcomes (i.e., scope of implementation, extent and duration of product incorporation, degree of problem solution).
- External technical assistance played significant but different roles in facilitating both types of outcomes, Knowledge-Use/Implementation and School Improvement/Capacity Building.
- On the whole, the amount and diversity of resources for training provided by experts and program developers that related directly to knowledge utilization objectives were more important than field agent (generalist) support in producing both knowledge utilization and capacity building improvements.
- The generalist field agents were particularly important in facilitating improvement in the problem-solving behaviors of school staff, in increasing the overall level of effort, and in encouraging staff to expand the scope of problem definition and solution search and to undertake implementation of more comprehensive solutions. However, a high level of involvement by agents may reduce capacity-building outcomes.**

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* These points enlarge on the summary presented in Louis, Rosenblum, Molitar, et al., 1981, pp. 227-228, and quoted at the end of Section III-C.

**Compare this particular finding with the RBS/LSI agents who were co-opted by site staff into undertaking many of the RBS problem-solving process roles and were thus prevented from gradually withdrawing and leaving site teams to train others in the use of the RBS processes.

- The commitment of staff to undertaking more high quality, comprehensive solutions, especially when these solutions addressed core school problems dealing with teaching and pupils, led to more pervasive product incorporation and greater problem solving.

- The strictly rational quality of the problem-solving process is less important in producing KU outcomes than has been thought; however, problem-solving quality (as represented in measures indicating that core instructional problems were, in fact, identified and that the chosen solutions were were perceived by the staff as being of high quality and relevant to the problem) is a consistently significant predictor of all major knowledge utilization outcomes. It is also a key to school improvement/capacity building outcomes. However, both quantitative and qualitative data indicated that the RDU projects failed to make pervasive changes in the schools' problem-solving process or the general tendency of schools to prefer locally developed solutions and local expertise.

- School characteristics, such as staffs orientation to change and the amount of principal influence, were important factors affecting implementation of a problem-solving process, but their combined influence was no more, and sometimes appreciably less, of an influence than the impact of the RDU intervention (product, external assistance, problem-solving process).

- The biggest payoff in terms of both knowledge utilization and school improvement was realized by emphasizing the resolution of problems that affected the core activities of the school--teaching and pupils.

- Costly change efforts were not more likely to have significant impacts than less costly efforts. Indeed, greater reliance on federal funds had significantly negative results on several outcomes, including lower incorporation of the problem-solving process, lower rates of problem solution, and lower personal and organizational impacts. However, in-kind school contributions had significant positive effects on product incorporation, personal impacts, and organizational impacts. Moreover, it is important to allocate large portions of resources to pay for teacher involvement, especially in selecting a solution and planning for implementation.

- Finally, though not all schools followed program specifications for a rational problem-solving process and implementation of an R&D-based or validated product, the RDU intervention had almost no significant negative impacts (see the RDU outcome typology, p. 3.46).

Significant DESSI study findings. Since the DESSI study analysis is in process and the final report is not yet available, summary findings with respect to this study must be more tentative. However, here are some perhaps significant points:

- The DESSI findings also pointed to two different types of outcomes: an individually focused set of outcomes and a school-focused set.
- Characteristics of the implemented practice per se had very few significant relationships to outcome measures for any of the statistical structural model solutions.* However, the degrees to which the innovation required a major or minor change in teaching practices profoundly affected the pattern of factors that influence individual teacher outcomes.
- As in the RDU study, external technical assistance was found to play significant roles. However, the DESSI results differed markedly among the models that were examined. The school-focused model displayed the clearest evidence of positive and substantial effect of external assistance on the DESSI measure of organizational change benefits, which, in turn, was the only variable that had a significant effect on institutionalization of the practice. The individually focused models produced two different patterns of relationships, depending on whether the innovation required a minor or major change in teacher practices. External facilitators had little effect on any outcome measure when minor change was involved. The results for the major change group were initially counterintuitive, but informative. Though the External Facilitator Help factor was found to have no significant relationship to three of four outcome measures, facilitator help had a significant negative impact on teacher practice change. Secondary analysis, which unbundled this measure into its component items, indicated

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*This finding bears little if any direct relation to the RDU finding that good products produce good school outcomes, since the measures employed are vastly different. With the exception of a few local IV-C sites, all DESSI study sites were selected because they were already known adopters of a BEH, JDRP, or IVD validated practice. Practice characteristics in the DESSI study were represented by only two variables, the innovation's implementation requirements (for training, materials, personnel) and the prescriptiveness of the innovation (i.e., the range of variation deemed acceptable by the developer for the innovation's various components). The implementation requirements measure does not appear as a significant element in any of the results reported. Prescriptiveness was found to have a negative relation of borderline significance with teacher classroom change (in the individually focused model, where major change was required). Prescriptiveness was also significantly negatively related to time spent in evaluating the practice by teachers, but this variable, in turn, appears to have no significant relation to any of the other study outcome measures.

that some aspects of facilitator help were positive, whereas others were negative. It appears that the more assistance that is given to teachers in working through the practice in its local context, the more positive impact the external facilitator is likely to have.*

- Though outside help from specialists and developers was a significant influence at RDU sites, its effect in the DESSI study was less clear, but was at least positive.**

- Extensive compliance with a rational problem-solving process was generally not emphasized in any of the programs included in the DESSI study and was therefore not treated as an important predictor variable. Perhaps the closest variables to process measures in the DESSI study were those that measure time spent by teachers on various aspects of the innovation implementation.***

- However, school and staff characteristics and local sources of support (from district level administrators and from school principals and others) were major areas of interest and concern for the DESSI researchers. Principal help and help from local facilitators proved to be a significant element in influencing many outcomes.* In addition, at least two school context measures (which were employed only in the school-focused model) were found to have significant influences. Large districts were positively associated with greater staff readiness, principal commitment and leadership, and user mastery. However, large schools were associated with lower readiness and commitment, but greater principal leadership. Readiness for change was a significant antecedent to practice change for individual teachers. Characteristics such as faculty attitude toward school improvement, teacher commitment, and existence of a conducive environment for problem-solving entered as significant predictors in the school-level outcomes model.

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* Recall that Cox and Havelock indicated that external facilitators often worked with school staff off-site and that, indeed, much less than half the sample of external facilitators said they were familiar with the practice as used at the selected site. This result seems comparable to the significant relationship found in the RDU study for amount of field agent time spent at the site.

** We first note that in the DESSI study the majority of the External Facilitators were, in fact, NDN or state Title IV-C Developer/Demonstrators (D/Ds). The facilitator generalist (here SFs) and specialists-developer (here D/Ds) roles, which were separated in the RDU study, are confounded in the DESSI study, since all are classed as External Facilitators. In the DESSI study, a measure of outside help (from External Facilitators or others) to individuals was reported to have a significant positive relation to just one outcome measure: benefits/gains on the part of teachers required to make a major change.

***In the individually focused model involving teachers who were required to make major changes in their practice, time spent by teachers on the practice in the classroom and time spent on working with the materials were both of borderline significance in positively affecting changes in teacher practice. Time spent on materials was again of borderline, positive significance in affecting practice-specific mastery; however, teacher time spent in communicating with others about the innovation and its implementation was positively and significantly related to practice-specific mastery. Finally, time spent in the practice in the classroom was of borderline significance in positively affecting the fidelity of adoption. Time was not significantly related to benefits/gains.

- The DESSI models thus generated at least three different images of school improvement. When only small changes on the part of individual teachers were involved, only elapsed time and teacher commitment (e.g., sustained individual teacher effort) proved to be significant factors. Neither external nor internal assistance, nor any other context, process, or practice characteristic was found to have a significant relationship.** When major change was required of individual teachers, far more complex predictor-to-outcome relationships were found, but most of these significant relationships involved staff readiness for change, time spent on the innovation, or local assistance, such as principal help or help from local central office staff. As we have noted, the effect of external facilitator help can be either positive or negative, depending on the particular type and location of external assistance. Finally, when the model shifted to examination of factors influencing school-focused outcomes, a highly complex pattern of significant relationships was found. It is in this model that the most positive and significant effects of external facilitator help were demonstrated. The role of the principal was also important. Principal management style, principal leadership, principal commitment to the innovation, and principal help were each positive influences on one or more outcome measure. Other positive influences included: local facilitator help, teacher sense of control, and teacher commitment. Size of school district and size of school also were significant influences.*

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* Principal help was significantly related to perceived benefits/gains and to fidelity of innovation adoption in the individual-level model, where major change was required of teachers. In the school-focused model, principal commmitment was significantly related to principal help, which, in turn, positively affected practice-related mastery. Principal leadership was at least of borderline significance in positively affecting (along with an even stronger influence from external facilitator help) the level of organizational change, which, in turn, significantly affected the institutionalization of the innovation. Help from local (central office) facilitators significantly influenced teachers' change in practice and had a borderline significant impact on the amount of benefits teachers attributed to the use of the practice. In the school-focused model, central office help showed a direct and significant relationship to teacher commitment and was also the only variable in the school-focused model that showed a possibly significant relationship (of borderline signifance, i.e., more than .10 but less than .05) with the strength of teachers' feelings that the adopted practice solved the problem they had faced.

**We note that this finding suggests that minor change teachers are thus prime targets for agents who are forced to deal with high scope (many clients) and low intensity job demands that are typical of Information Use Assistance stategies.

- The biggest payoffs in terms of practice improvement for individual teachers was realized when teachers undertook the implementation of innovations that required them to make major changes in their practices. When this occured, a variety of primarily local forces appeared to come into play to help influence positive outcomes. When minor practice change was undertaken, elapsed time since adoption and individual teacher commitment were the only significant factors needed to explain the usually limited outcomes.

- The major contribution of external agents, other than introducing the innovation, appeared to be in their direct and significant effect on organizational change benefits (i.e., nonindividual benefits resulting from implementation of the innovation), which, in turn, provided the only significant path to institutionalization of the innovation.

5. Discussion and Commentary

The RBS/LSI, RDU, and DESSI studies are all remarkable contributions to the empirical literature on linking agents on at least three counts. First, they provide us with some knowledge regarding intermediate or more distal outcomes in schools as a result of linking-agent-initiated efforts to assist school staff to implement improved school practices. Second, all three studies provide data that indicate how external assistance, local assistance (from central office administration and school principals) and school staff characteristics/activities interact to account for outcomes. Third, all three studies have relied heavily on a combination of quantitative and qualitative data to present, explain, and illuminate their findings.

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*Perhaps two unusual and as yet unexplained elements in the school-focused model are, first, that school adminstrator (superintendent) power over the implementation entered as a zero path coefficient; and, second, that faculty attitude toward school improvement displayed a significant negative path to the organizational change outcome.

The RBS/LSI study involved only 11 sites and a handful of predictor measures derived from extensive ethnographic notes and reports. Perhaps the truly remarkable finding here is that, despite such a small sample, statistically significant quantitative relationships were demonstrated. By contrast, both the RDU and DESSI studies are indeed massive, in the number of agents and sites involved, in the number of data elements per agent and site that were recoreded, and in the extent and complexity of the data analyses that were performed. This wealth of data presents immensely more detailed and complex images of the interplay of forces than could be depicted by the few variables in the RBS/ LSI study. However, there are some consistent themes across all three studies. First, there is the point that the local context, including school and staff characteristics, readiness, and motivation, is extremely important in accounting for outcomes. The second common theme is that local help from central office staff or school principals is also important. A third theme is that the nature of the innovation and, more particularly, the demands it places on local staff to undertake major changes are important. A fourth theme is that external assistance can be important, but the size, nature, and even the positive or negative direction of influence depend on many factors (such as where, when, how, by whom, and for whom) is external assistance provided. Finally, a fifth theme is that impacts vary, depending on what you look at.

Here are some comments on these five themes, taken in reverse order:

Multiple outcomes. The Abt researchers made the point that they attributed the highly significant positive effects of RDU on schools to two major causes. First, the RDU strategy combined extensive external technical assistance, quality products, and a sophisticated but practical problem-solving process to achieve its effects. (Indeed, among all the programs, RDU is the only one where there is clear, robust, and reasonably compelling evidence that the combined effect of the external intervention either matched or exceeded the local context/factors.) Second, the Abt researchers took a very broad view of possible outcomes.* They noted that if their study had been confined to an emphasis on only product incorporation and problem-solving process incorporation, as measures of long-term success at the school level, the RDU success story would have been much less impressive. They concluded that success is, in part, a matter of definition. Where major change efforts are involved, they ought to be matched by an effort to measure broad impacts that cover a variety of types of possible outcomes.

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*Major outcome variables included: (1) satisfaction with the field agent, (2) satisfaction with the problem-solving process, (3) scope of implementation, (4) extent to which the problem was solved, (5) degree of incorporation of the adopted product, (6) personal impacts, (7) impacts on the school as an organization, and (8) incorporation of the problem-solving process.

The DESSI findings reinforce this view of the need for and usefulness of multiple outcome measures.* Again, had the DESSI study confined its findings with respect to outcomes to, say, individual teacher practice change and individual teacher practice-specific mastery, and had the researchers not "unbundled" their measure of help from the external facilitator, we would have been confronted with the puzzling and perhaps uncomfortable finding that external facilitator help has a significantly negative effect on one outcome and no effect on the other. We would have missed the fact that outside help for individuals significantly affects individual benefits/gains for teachers and would have failed to discover the significant positive effect of external facilitator help on organizational change benefits and program institutionalization.

The lack of a larger and broader set of outcome measures in the RBS/LSI study is perhaps the counterexample that makes the point. Here we are told that the linking agents were highly useful because they mediated the extremely negative effects of RBS-site tensions on both team progress and team sense of ownership outcomes, but we are confronted with sparse data that present no clear image of the innvoation(s) that were implemented, the linker behaviors that were employed, or the site outcomes that might begin to match the rich but totally qualitative descriptions provided by Corbett. Perhaps the moral here is that limited measures of success run the risk of producing limited evidence of success.

Complex linking agent effects. This theme is an extension of the previous one. When multiple measures of linking agent assistance are combined with multiple measures for outcomes and other factors, complex but meaningful patterns of impact results are obtained. Moreover, when effects are examined on different levels, different patterns are found. Here are some specifics. The DESSI study found that help from the external facilitator had no discernible effect on any of four individual teacher outcome variables when only minor changes in practice were involved. However, when major changes in practice were involved, the gross measure of external facilitator help had a significant negative effect on one teacher outcome measure, change in practice. When the external assistance measure is reduced to its components, it turns out that some kinds of external help are negative and others are positive. Detailed examination of the relationships among variables suggests that how agents allocate their time among assistance functions and where assistance is given account for the differences. Positive effects of external facilitator help are produced when direct, on-school-site assistance is given in helping teachers to work through the processes of the innovative practice in its local context (i.e., assistance given to teachers in planning implementation schedules; providing technical assistance or follow-up training; assisting teachers in working out procedural details; developing plans to support continuation; and developing additional new users at the site) (Cox and Havelock, 1981, p. 19). The converse, of course, is that total amount of external facilitator help, especially when time is allocated to other types of activities and especially when those activities do not deal with specific school site implementation problems, can actually have a negative effect by depriving teachers of the type of assistance they need most. This general conclusion is reinforced when we find a statistically significant and direct positive effect of the measure of outside help for individuals and personal benefits/gains reported by teachers. And, finally, as we have repeatedly noted, external facilitator help emerged as a major predictor of organizational change benefits and institutionalization of the practice in the school-level model.

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*The DESSI individually-focused model included four major outcome variables: (1) perceived benefits, (2) change in practice, (3) practice-specific mastery of the innovation, and (4) fidelity of adoption. The school-focus model included: (1) plans for continuation, (2) benefits due to organizational change, (3) institutionalization, (4) teacher commitment, (5) practice-related mastery, (6) personal gains, and (7) degree to which the practice solves user problems.

The RDU external assistance patterns are even more complex, but informative. Here are some specifics. An aggregate measure of site staff satisfaction with the field agent for 180 RDU school sites indicated that this measure was significantly related ($P < .05$) to five other outcome measures: satisfaction with the problem-solving process ($r = .42$), personal impacts ($r = .27$), organizational impacts ($r = .26$), degree to which problem was solved ($r = .18$), and scope of implementation ($r = .16$); but it was not significantly related to R&D product incorporation or the process incorporation. When seven measures of the external assistance (as contrasted to staff satisfaction with assistance) were correlated with six outcome measures ($N = 75$ schools), four of the seven assistance measures displayed statistically significant correlations ($P < .05$) with each of three or more of the six outcome measures. Field agent initiative and field agent intensity of services each displayed a significant relationship (correlations ranging from .33 to .49) with scope of implementation, product incorporation, and organizational impacts.* Field agent initiative and intensity were unrelated to personal impacts, process incorporation, or degree to which the problem was perceived as solved. However, the two external assistance training measures, amount of training and variety of training resources, displayed significant correlations with all six of the school improvement outcome measures (with correlations ranging from .26 to .59) (Louis, Rosenblum, Molitar, et al., 1981, p. 112). It is this significant and pervasive effort of training, as contrasted to the more limited but significant effect of field agent (generalist) initiative and intensity of service, that caused Louis and her colleagues to distinguish between the effects of generalists and training experts. The two types of assistance combined to produce quite different results in accounting for the six school outcome measures; multiple correlations indicated that these combined sources of external assistance were, by themselves, able to account for 40 percent or more of the variance in three outcomes: scope of implementation (46%), product incorporation (43%), and organizational impacts (40%). However, their combined effects accounted for substantially less of the total variance in the other three outcome measures: problem solved (21%), personal impacts (19%), or process incorporation (14%). We thus see that external assistance has substantially greater effects on some school improvement outcomes than on others, that the effects of training tend to be more pervasive than those of generalist-facilitator assistance, and that both types of assistance combine to produce incrementally positive effects for several outcomes (most notably scope of implementation and product incorporation).

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*All relations were positive, except F.A. Service Intensity and Product Incorporation ($r = -.40$). Apparently, overly intense agents inhibit effective product incorporation.

Innovation characteristics and demands. The RDU study again provides the richest source of information on the relation of the characteristics of the innovation to outcomes and to other variables. With approximately 100 different products represented in their school site data samples, and with 11 measures of product characteristics and six outcome measures, the RDU study produced a number of significant correlations that seriously challenge the notion that product characteristics are not important in explaining implementation and school improvement outcomes. Among the 11 product measures, the three most robust predictors (significant coefficients in three or more regression equations) were product quality (as perceived by users), product complexity, and difficulty of implementation. Surprisingly, all three variables exerted positive influences. That is, the more complex products (in the sense of the number of things that must be changed in order to implement the product) and the more difficulty teachers reported they experienced in implementing the products, the greater was the positive impact on various outcomes. Product characteristics alone accounted for substantial portions of outcome variance. Indeed, half the variance in the measure of the degree to which the problem was solved was accounted for by five product characteristics, but principally by product quality and difficulty of implementation. More than a third of the variance is predicted for all but one of the six outcome measures.*

When we turn to the DESSI study, we find a more limited set of findings. Perhaps the most notable point is that the DESSI study analysis of predictors of outcomes for individuals (individually focused model) made no progress until the sample was split into teachers for whom the innovation represented a major or minor change. When this was done, significant but different patterns of predictors were found in both samples. Although the RDU data on product characteristics were aggregated to site rather than individual teacher, there is a remarkable correspondence between the RDU product characteristics of product complexity and difficulty of implementation, which positively affected outcomes, and the DESSI distinction of minor versus major practice change. After splitting the sample in terms of the teacher practice change requirement, the DESSI researchers employed two other practice (product) characteristics employed as predictors in the individual outcomes regression models: prescriptiveness of the innovation and implementation requirements (training, materials, personnel). Only prescriptiveness was found to be a marginally significant ($P < .10$) predictor of one outcome, that of teacher practice change. Highly prescriptive innovations (permitting little adopter latitude) inhibited practice change. Innovation characteristics are not represented directly in the DESSI school-focused model of outcomes.

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*See Table 4, Section III-C, for the outcome variables and the exact values.

The RBS/LSI study provided only qualitative and vague descriptions of the innovations characteristics of the three RBS school improvement components (basic skills, career preparation, and citizen education), and no cross-tabulations by type of RBS component or its characteristics was reported for the 11 LSI teams.*

The importance of local assistance. Local assistance as provided by central office administrators or school principals was found to be a significant influence in all three studies. These effects were muted in the RDU study, where the focus was heavily on team effort. The principal's role as an instructional leader exerted small but significant influences on organizational impacts ($r = .25$) and degree to which the problem was solved ($r = .15$). The principal's influence in decision making also exerted a small but significant positive influence on organizational outcomes. On the other hand, the influence of the superintendent and of other central office staff on outcomes was usually insignificant and often mildly negative, with just one exception--where central office staff appear as a significantly negative predictor of problem-solving process incorporation. Principal, teacher, and faculty influences were all positively related.**

In the DESSI study, the principal and the central office staff appeared as much more prominent predictors of both individual and school-level outcomes. Help from the principal and help from the central office both enter as significant or borderline significant predictors of individual teacher benefits. Help from the central office staff (who were often curriculum or instruction specialists) significantly influenced changes in teacher practice. Teacher practice-specific mastery, however, depended primarily on the time teachers spent on the practice, mainly in classroom practice and in communication with others about the practice and its implementation. Principal help was the primary factor affecting fidelity of implementation, with teacher time spent in classroom practice also contributing marginally. As we have noted elsewhere, a number of local principal and staff factors exerted significant influences in the school-focused outcomes model. These included: principal leadership, principal commitment, principal help, and local facilitator (central office) help.

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* However, we are left with the impression that differences among the three RBS components in their demands on sites to conform with their particular change process approaches may have contributed to the significant and highly negative relations between the RBS-team tension and the team's progress and team sense of ownership.

**Most RDU projects were school-based rather than district-wide. The majority of the superintendents or assistant superintendents (68% during problem implementation; 82% during implementation) had little or no influence on decisions related to the projects. Other central office staff were more likely to take part, but their influence was usually much less than that of the school principal or teacher.

Finally, the RBS Local School Improvement Study found that the degree of central office staff support was perfectly correlated with team progress and thus appeared as the most powerful positive effect on this outcome measure.

Staff and other school context influences. The RBS/LSI study provided no data on the relation of school context measures to outcomes or other variables.* However, teacher problem-solving motivation was a positive and powerful predictor of both the LSI teams progress and its sense of ownership of the curriculum improvement effort.

Teacher commitment to the innovation and time spent on the innovation were the only relevant variables of this type that were employed in the DESSI models of individual teacher outcomes. As we have noted, the teacher's commitment to the innovation and the length of calendar time the teacher had been using the innovation were the only significant predictors of outcomes where a minor change effort was involved. Where major change efforts were involved, time spent by the teacher on various aspects of use (i.e., classroom, materials, communication with others) was a significant, or at least borderline, influence on change in practice, practice-specific mastery, and fidelity of implementation outcomes. Teacher readiness for change was also a significant predictor of change in practice.

In the DESSI school-focused outcomes model, both size of school and size of school district showed significant or borderline influences on staff readiness, principal commitment (which, in turn, affected practice-related teacher mastery), and principal leadership (which, in turn, affected organizational change benefits, which, in turn, affected institutionalization). Size of school district also showed direct positive effects (but of borderline significance) on practice-related mastery and on teacher commitment (which, in turn, positively affected the measures of staff perceptions of advantages and personal gains). The DESSI findings thus indicate that both school size and district size act as important influences on various school improvement outcomes. Teacher control, teacher commitment, and faculty attitude toward the innovation and the conduciveness of the environment to problem-solving are also significant influences on school-level outcomes.

Even when we exclude RDU site characteristics measures dealing with superintendent, central office, or school principal variables that we considered in the previous section, the RDU study reported data on more than a score of variables that define characteristics of the teaching staff, school size, structure, and climate, and the community setting. When these variables were related to each of the six major RDU outcome measures, well over 100 correlations were produced. Examination of the correlations and a series of multiple regression solutions led the Abt researchers to these summary findings:

- Variables measuring the school's climate for innovation were quite significant in explaining change, with particular importance being accorded to variables tapping the teachers' orientation toward change and the experience of the school in prior problem-solving activities related to the problem in question.

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*However, Corbett, Dawson, and Firestone (December, 1982) which was not available in time for this review, does consider a number of school context influences.

- Also important in explaining school outcomes was the nature of the problem: a focus on classroom organization and/or pupil achievement tended to be associated with higher levels of change.

- Structural features of the school, particularly the degree to which teachers influenced the decision-making activities, affected the outcomes of the change.

- Unlike many other studies, the data do not indicate that demographic characteristics of the school, including principal demographic characteristics, teacher demographic characteristics, or student demographic characteristics have profound impacts on the outcomes of participating in an innovation [RDU] program . . .

- These findings suggest that local site characteristics that affect the outcomes of the change process are those that may, in fact, be the most susceptible to change themselves. Thus, it is difficult to alter the level of a school--whether it is secondary or elementary. However, teachers with attitudes that are unsupportive of change may, in fact, be made more positive if they are given reasons to believe that their efforts will be rewarded and will produce something of value. Similarly . . . , it is relatively simple to begin a major change program by emphasizing issues that relate to classrooms and pupils. (Louis, Rosenblum, Molitar, and others, 1981, p. 162, bullets added.)

Conclusion. In this section we have reviewed a wide variety of findings regarding the effects of external and internal agents and other factors on various outcomes of school improvement efforts. In the aggregate, they provide impressive evidence that externally initiated and facilitated change efforts can produce positive changes in schools, both in the curriculum and instructional practices of individual teachers and in the organizational relationships and problem-solving structures and processes of schools as organizations. These changes, in turn, lead to many other organization and personnel benefits for schools, for staff, and for students. Moreover, although the total change costs, including in-kind contributions of site and school district staff time and effort, were modest, large, broad-scale change was often accomplished and these efforts were usually associated with large payoffs. If little was ventured, little was gained. A related point is that large amounts of external support (whether in dollars or assistance effort) were not always required and could sometimes even be counterproductive. What seems to matter is when, where, and how external assistance is provided and toward what aspects of the complex sequence of change events it is directed.

Many of the effects of external assistance are indirect and perhaps missed in the measurement of effects. Certainly the role that external agents and agencies played in initiating the innovation effort and in helping to introduce potent products and problem-solving practices may be overlooked when a study focuses only on more direct measures of agents' contacts and activities. And as we have seen clearly in both the RDU and the DESSI studies, external facilitator-generalists often make their most potent contribution in getting things started properly and attending to organizational factors that mobilize and sustain local staff interest, commitment, help, and participation. We have also seen that these agents can play other potentially important roles in finding and introducing appropriate high-quality products and practices, in encouraging broad staff participation in solution selection, planning for implementation and other phases of the change process, and in helping to identify and arrange for intensive and extensive expert assistance and training at appropriate times. Indeed, as we see clearly in both studies, these forms of outside expert assistance were often the most consistently positive, pervasive, and potent sources of external assistance.

However, the effects of external assistance on outcomes were often matched by sources of internal assistance, beginning first with teachers themselves, and then often extending to potent, if sometimes subtle, roles played by school principals. The role of central office staff can also be important, but seems contingent on program design and other factors.*

Perhaps the key point in all these findings is that external assistance can help schools to improve in very powerful ways by initiating and helping to orchestrate a wide variety of internal and external personnel, material, and knowledge resources so they can be focused, organized, and applied in systematic and sustained efforts to address significant education problems. Typically schools and school staff are organized to pursue relatively individual and isolated job roles where attention perforce must be given primarily to "maintenance" and "coping" with routine daily activities. As Fullen has noted, neither teachers nor principals nor central office staff are typically able to play effective knowledge use/implementation roles by themselves. The available research strongly suggests that this failure is due to the way schools and school districts are organized, the way individual jobs are structured, and the way goals, motivation, incentives, and rewards for school improvement are defined and managed. Our argument is that, in comparison to Knowledge Use Assistance Strategies (e.g., SDGP) or the various forms of Technical Assistance Strategies (e.g., RBS/ESA), the great power and high payoff of these Problem Solving/ Program Implementation Strategies (as evidenced especially in the RDU and DESSI data), are to be found in the fact that the external agents went far beyond assisting individuals in finding and learning to use relatively diffuse forms of knowledge, or to deal with specific but often isolated curriculum changes, or to acquire particular but often unrelated sets of skills. Rather, the agents employing

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*Central office assistance was not shown to have appreciable effect on any of the RDU outcomes, except for a negative effect on the incorporation (continuance or repeated use) of the RDU problem-solving process. However, central office ("local facilitator") help positively and significantly affected instructional practice change and instructional practice gains and benefits in both the DESSI individual-focused and school-focused models. In the RBS/LSI study, central office support was perfectly correlated with local site team progress in the school improvement process and was highly correlated with teams' sense of ownership.

Problem-Solving/Program Implementation Strategies undertook initiation and support of far more comprehensive school improvement changes involving highly practical, proven, and (site) contextually relevant solutions for significant instruction and pupil performance problems. They also helped school staff to deal more directly with the organizational, job-related, and motivational impediments to mobilizing and sustaining team efforts to deal with school-improvement problems. High quality products, effective problem-solving and implementation processes, and local, timely and appropriate training and technical assistance could then all play positive, complementary, and incrementally additive roles in contributing to a wide variety of school improvement outcomes and benefits. But it may well be that the mobilization and continued support of school staff to work, as individuals and as teams, on school improvment efforts that go far beyond those they are able to address individually in the normal context of their daily work, are the fundamental keys to the success of these external assistance strategies.

E. Effects of Program, Host Organization, And Clients On Linking Agent Activity

The theoretcial conceptions of linking agent roles reviewed in Section II-A specifically considered the different roles that linkers might play, depending on their programmatic entitlements.

In Section IV-A, we saw how program and type of agency--but, perhaps more fundamentally, the type of dissemination program strategy and the geographic scope of the agents' service region--powerfully interact to define the general patterns of roles and expectations for linking agent work. In Section IV-C, we saw how these different strategies resulted in markedly different findings regarding the specific scope and nature of linking agent work, as defined in results of factor analyses of the roles and activities played by agents. However, these are rather gross and largely static images of what is, in fact, a far more complicated and highly dynamic interplay of numerous, complex interorganizational and interpersonal transactions. These transactions are played out over periods of time that are often are measured in years, rather than months or days, and involve different types of organizations are often operating in highly different contexts.

The effects of these contexts on linking agents were also considered by the reviewers of the theoretical and empirical literature described in Sections II-A and II-B. Crandall gave special attention to the "universe of the linking agent" in terms of the three systems in which the linker is involved: the resource system, the client system, and the linker's host agency. Each of these systems represents perhaps vastly different cultural, organizational, techniical, and social configurations that call for skills and sensitivities in comprehending and coping with the goals, motivations, operating assumptions, and preferred styles and interests of various persons, groups, and organizational divisions and levels of each system. The linking agent's task (whether performed by a single person, a team of persons, or an "agency") is to act as the intermediary, playing a two-way translation role, relative to resource systems (including sponsoring offices), client systems, and host agency(ies). Butler and Paisley further note that these systems are all multidimensional, including historical, political, economic, social, psychological, and cultural contexts that may or may not match. To the extent that the linking agent and each of these types of organization (resource systems, clients, host organization) share the same contexts (e.g., cultural, historical, political, social, economic), the work of the linking agent is eased, especially in playing an intermediary, boundary-spanning role. However, when the discrepancies are large, linking agents confront numerous problems, e.g., in defining their job position; negotiating their "entitlement"; interpreting and responding appropriately to the expectations of others; reducing role conflict due to inconsistent or incompatible expectation of others; selecting and employing consistent and appropriate strategies and tactics; securing appropriate and timely resources and support to perform needed tasks; deciding on the allocation of time and effort for various roles, activities, and tasks in terms of competing priorities and needs; interpreting and reconciling the aims and expectations of others relative to their own view of what should be done and what they themselves should do; and, ultimately, assessing their own sense of mission, worth, and accomplishment.

Boundary-spanning roles are often stressful, and, as the RDU study data especially demonstrate, agents sometimes reduce this stress by assuming "marginal" stances not closely associated with any one organization or by complying with more minimal client expectations to play more conventional content expert roles. Moreover, these stresses undoubtedly increase as agents assume broader entitlements that call for more intensive programmatic involvement with clients that, in turn, require the coordination of many persons, groups, and organizations within and beyond the client agency. We note in particular the RBS/LSI study, where mediation of interpersonal and interorganizational tension between and among teachers and administrators within the local education agency, and reducing tensions between the school sites and the RBS components became critical roles, which agents had to play successfully if the school improvement projects were to continue. Indeed, Corbett (1981) noted that, in addition to the original set of three primary technical functions that were assigned to the agents by RBS, at least five additional functions emerged that were largely related to obtaining the kinds of resources and social relations necessary for the change process to continue.

The Abt RDU study (especially Louis and Kell, 1981, but also Louis, Rosenblum & Molitar, 1981; and Louis, Rosenblum, et al., 1981) provide an immense set of data and descriptions of field agent roles in their organizational contexts and of the dynamics of interorganizational networks within which these agents worked. The scope of the Abt researchers' analysis is indeed immense, since they measured and related many variable sets, including those defining: personal characteristics of the agent; the design of the agent position; the characteristics of the training given the agent, the self-reported levels of skills possessed by the agent; the degree of support given the agent by supervisors and colleagues; the degree to which supervisors and colleagues influenced the agent's role performance; the agent's perspective of change (i.e, whether or not the agent believed that political systems, individual incentives, or the social structure of the schools best explained and conditioned the outcomes of school change efforts); the roles and activities that agents performed and how these related to their own and others' expectations; the job-related attitudes of agents, including their sense of commitment; their sense of role conflict, and their sense of organizational marginality; the characteristics of the agent's relationship with sites, including the agent's influence over site activities and decisions; the foundations for the agent's influence over sites, and the influence of site administration on field agent activities and time allocations; and, finally, measures of the field agent's own sense of effectiveness (Louis and Kell, 1981). Then in subsequent analyses, they related selected measures derived from this massive search for the patterns and determinants of agent roles, activities, and relationship to a broader set of variables that included measures of client (teachers' and principals') satisfaction with the agent and the problem-solving process, and also six major measures of school improvement outcomes (Louis, Rosenblum, Molitar, et al, 1981). See Section IV.D. above for the summary of the latter analysis regarding agent effects on sites and school improvement outcomes.

However, with respect to the factors that affect agent roles and activities, Louis and Kell provide a particularly succinct conclusion:

> What field agents actually do in carrying out their jobs is . . . a function of a variety of factors. Two influences on role enactment are most critical: the support and influence system set up by the sponsoring organization, and the influence and interactions with key school-level administrators who act as gate keepers in defining what the agents will do in their districts. In sum, what agents do is primarily a function of the patterns of interpersonal influence in which they are embedded. Most notably, higher levels of influence from all major role partners--the project director, project evaluator, host supervisor, and site administrator--tend to lead to more extensive performance of "boundary-spanning activities," i.e., those activities through which agents communicate information and influence across organizational boundaries. High levels of influence from project staff tend to lead to a greater emphasis upon the "program change expert" role, where the agent is actively involved in assessing the match between site problems and innovations, implementing those innovations, and evaluating the outcomes [which is consistent with the RDU project's definition of purpose and mission of the agents]. Conversely, high levels of influence from the host supervisors tend to lead to an emphasis on the less intrusive "content specialist" and "generalist-coordinator" roles. (Louis and Kell, 1981, pp. 168, 170)

A related significant finding of their RDU analysis was that agents with a high sense of local marginality (i.e., low sense of affiliation with either their "host organization" or their local school sites) were less likely to adopt the program change expert role and were also less likely to engage in boundary-spanning activities. Older agents and agents with more teaching experience were also less likely to engage in boundary-spanning activities. However, the more field agents engaged in boundary-spanning activities, the more role conflict they perceived. Given the apparent differences in expectations between project and host organization supervisors, on the one hand, and those of site administrators on the other, as indicated by the significant correlations between different sources of influence and these competing agent roles/activities, it is little wonder that intensive boundary-spanning agents should perceive role conflict. However, neither role conflict nor the specific roles that agents assumed and the activities they performed had very great impacts on intermediate measures of agent effectiveness, including client satisfaction with the agent and the process, the agent's perception of program success; and the agent's assessment of the quality of local site decisions and activities.

The Abt researchers found that the general strategies (i.e., perspectives on change) that the agents adopted were more important than the specific roles. A political change orientation, which was overwhelmingly avoided by RDU agents, was particularly effective in increasing principal satisfaction, but it had an opposite effect on teachers. An individual incentives orientation that attended to individual needs and concerns created a more favorable impression among teachers and was the most popular approach among agents. A structural perspective orientation that involved emphasis on understanding roles, division of labor, and rational organizational planning processes was also popular among agents and was associated with higher agent job satisfaction, but generated mildly negative response from school principals. It thus appears that different perspectives may work well in some situations and with some role groups, but less well in others. Hence there may be no one specific strategy that is particularly effective. But more generically, a low-key supporting orientation to change that emphasized industrious, dependable, stable, cooperative behavior over more "innovative" characteristics (i.e., inquiring, original, self-reliant, flexible) generated significantly greater satisfaction among teachers and principals with both the agent and the change process they supported. This one pattern emerged most clearly and consistently as a successful agent strategy for producing client satisfaction; however, even it was totally unrelated to other measures of school improvement outcomes. Moreover, the Abt researchers confirmed Hall's findings regarding the lack of coherent agent strategies (see footnote, p.2.20) by noting that the RDU field agents tended to not be explicitly aware of their overall strategies for change:

> Unless forced to reflect on their assumptions about how the change process proceeds in schools, most agents, in our experience, tend to act on intuition rather than because they have some explicit game plan for dealing with a site. The relative importance of perspectives for the agents' effectiveness with clients suggests that agents would profit from a support system that requires them to clarify the assumptions and strategies that underlie their intuitively arrived at behavior patterns. Our suggestion is not that agents should give up their knowledge about how best to respond to clients in particular settings. Rather it may be important to urge the agents to stand back from their own behaviors and to determine how these behaviors either do or do not add up to a strategy that will be effective with the group they are trying to influence. (Louis and Kell, 1981, p. 171)

Finally, the RDU descriptions indicate that agents' strategies and approaches to change were primarily the products of their own backgrounds and training. Because all were professional educators, they brought to their roles a heavily individualistic, psychological orientation that often prevented them from seeing the school system as a social and political system of power and influence. In most cases, they learned through trial-and-error processes. As we have noted earlier, formal training provided by the RDU projects appeared to have little impact on their role performance, but repeated contact with significant others (e.g., project and host agency supervisors and school administrators) tended to shape the orientation of their roles. In most cases, no one except the agents themselves was in a position to observe and reflect on the appropriateness and effectiveness of their efforts. High levels of boundary-spanning and interaction among key representatives of the various agencies they were linking increased role conflict, but this conflict was not necessarily dysfunctional to job performance, although it undoubtedly created ambiguity with respect to obtaining "knowledge of results" that would serve to reinforce effective learning. Because most agents spent much more time with school clients, these clients were often in a better position to influence agent behavior than were more distant supervisors and colleagues, who were much less well-informed concerning the site specifics and their implications for agent behavior and on-the-job learning.

In all this discussion, we should note that we have focused almost exclusively on the linking agent-generalists. However, many schools in the RDU and DESSI (presumably NDN) programs also received focused training and substantial technical assistance from experts who assisted the school sites in program implementation. Both types of technical assistance had significant impacts on school improvement outcomes. The RDU data especially make it clear that the generalist field agents were perceived by teachers and principals as more helpful to them than were the providers of specialized assistance (e.g., trainers, evaluators, program implementation specialists). Over all, school staff preferred the sustained attention and support of these generalists, as compared to the episodic training event or brief consultant specialist visit. Both the RDU and the DESSI data indicate that the more assistance schools received (especially on-site) from both types of technical assistance providers, the greater were the benefits. However, although the generalists were apparently more popular with clients, it appears that the amount and variety of training received from the outside experts had a greater impact on school improvement. Moreover, the DESSI and the RBS/LSI findings suggest that, where the basic thrust of the innovation appears to constructively involve central office specialists, these internal-experts also contribute positively to significant school improvement outcomes. Unfortunately, the importance of multiple, complementary roles, although anticipated conceptually both by Havelock and by Butler and Paisley, has not been fully appreciated until recently. Consequently, the RDU and the DESSI studies provided us with some information on the roles and activities played by these "experts." however, these studies tell us little about how programs, host organizations, or clients, in turn, affected the performance of these expert roles.

For those interested in interorganizational dynamics and transactions of "agencies as agents," we commend the RDU report on designing and managing interorganizational networks (Louis, Rosenblum, et al., 1981), as well as several other school improvement interorganizational studies (Yin and and Gwaltney, 1981; Havelock, Huberman, Levinson & Cox, 1982; Cates, 1983).

Having reviewed and summarized the findings from these recent studies of educational linking agents, we turn, in the next chapter, to a discussion of their implications for school improvement in the 1980's.

CHAPTER V: IMPLICATIONS

Prospects for Educational Linking Agents and Agencies in an Era of Funding Cutbacks, Program Consolidation, and Federal Retrenchment

Although earlier legislation in the field of education contained implied requirements for dissemination, the impetus for federal involvement in dissemination and school improvement efforts can be traced to the National Defense Education Act of 1958, which contained the first major federal dissemination title (VII-B), authorizing the U. S. Commissioner of Education to disseminate information concerning new educational media, including the results of research and experimentation, to state and local education agencies for use in their public elementary and secondary schools and to institutions of higher education. Under Title VII-B, early experiments and pilot tests of educational information communication and dissemination methods were accomplished, including studies that prepared the first foundations of the Educational Resources Information Center (ERIC) system. The second major educational dissemination impetus came with the Elementary and Secondary Education Act (ESEA) of 1965. One of the key concepts of the ESEA and of many subsequent federal education programs was that external support for and stimulation of research and innovation could produce new ideas and methods needed to improve educational practice. Beyond providing schools with supplementary fiscal resources, these federal programs often dealt, either directly or indirectly, with the need to build national, regional, state, and local capacity to produce, disseminate, and use new knowledge and technology to improve American schools.* Although some federal programs included support for totally local innovation efforts, most federally sponsored school improvement efforts made provision to disseminate new products and practices, whether they were created by research and development or by practitioners themselves, so that useful new ideas, products, and practices would be made available to educators everywhere.

To assure better access to documentary sources of knowledge not appearing in commercial books and instructional materials, the Educational Resources Information Center (ERIC) was established in the late 1960s. In the summer of 1970, the Pilot State Dissemination Program was begun (in Oregon, South Carolina, and Utah) as a two-year experiment to test the feasibility of markedly increasing education practitioner access to, and use of, ERIC resources through the employment of "education extension agents." The success of this effort, in turn, laid the foundation for the initiation in 1975 of the State Dissemination Grants Program (SDGP), which in the ensuing years has enabled most state education agencies (SEAs) in the nation to increase their capability for delivering information to educational practitioners and others through information "linkers." The SDGP process of increasing SEA capacity, as we have noted in Section III-A, followed different patterns, depending on SEA history and context, but the objectives of the program were generally achieved.

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*By 1975, the Interstate Project on Disemination (IPOD, 1976) had identified a total of 208 dissemination requirements in federal education legislation and regulations, as well as 54 agents or agencies that were assigned responsibility at that time for the various educational dissemination activities.

During the same period, national and statewide mechanisms were created for identifying, validating, and disseminating promising practices that had been developed and evaluated by various federally funded programs. With federal leadership and support, SEAs were aided in developing Identification, Validation, and Dissemination (IVD) programs to identify and disseminate throughout their states the best educational programs produced for schools and other educational agencies in each state. At the national level, the Joint Dissemination Review Panel (JDRP) was formed to coordinate the review and approval of products and programs funded by the U. S. Office of Education and the National Institute of Education.

Created by the U. S. Office of Education in 1974, the National Diffusion Network (NDN) began as a mechanism for disseminating on a nationwide basis JDRP-approved products that had been funded under various ESEA titles. Over the following years, the NDN has matured to become a highly efficient and effective dissemination network that now serves schools throughout the nation. Shortly after the creation of the NDN, the National Institute of Education directly confronted the problem of finding a more effective and powerful way to combine the results of recent research on planned instructional change process support with its inventory of R&D-based programs and products. The NIE developed a massive, multiyear field experiment that became the Research and Development Utilization (RDU) Program, which was initiated in June 1976. And during the same period, state and intermediate education agencies also began to undertake their own state and federally funded dissemination programs (e.g., state ESEA Title IV-C, the California School Improvement Program and the New Jersey Program for Thorough and Efficient Education). Education service agencies, now numbering more than 1,000 and located in a majority, but not all, of the states, became another important link between state and federal agencies on one side and schools and school districts on the other. ESAs are as diverse in their functions, size, and governance structures as in their names: boards of cooperative services, educational improvement centers, educational service centers, county offices, intermediate units, etc. (Moran & Hutchins, 1981). Some are formal regional service branches of the SEAs; others operate with quasi-official state sanction; still others are independent cooperatives formed by local education agencies. As we have seen, many of the major federally funded dissemination programs included in this synthesis have involved use of linking agents located in these intermediate services agencies.

There is now in place a massive, but loosely structured configuration of federal, state, intermediate, and local public and private agencies operating under the aegis of many different federal, state, and other programs to provide various forms of dissemination and school improvement assistance to schools.

At the federal level, for more than two decades, federal categorical programs, now numbering in the hundreds, were based on various strategies (e.g, "seed money," "capacity building," "supplementation") that implicitly assumed "growth" models of schools in which slack state, intermediate, and local educational agencies' resources could be mobilized and articulated to undertake innovations that might be financially costly or organizationally risky.

These developments in the field of educational dissemination between the late 1950s and the late 1970s were played out in the context of much larger social, economic, and political events that influenced their development. Iannaccone (1981) has summarized these trends and their implications for the politics of education in general by noting that the years after World War II were a time of sustained economic growth, which created a benign environment that, in turn, fostered an increased federal role in social and educational problems. Further stimulated by the cold war and the baby boom of the 1950s, the U.S. society, in general--and parents, in particular--became supporters of education. President Johnson's Great Society produced an extensive overlay of federal education policies atop existing--and also growing local and state policies. Resistance to federal policy changes was overcome by a federal administration that was dependent on revenues from an expanding economy and traditional New Deal fiscal policies. The financial "carrot" of grants-in-aid was offered to induce educational change. Categorical social programs multiplied almost exponentially. Thus, over time, a basic transformation in intergovernmental relations occurred, with increasing centralization of educational policy-making in Washington as one of the major consequences. Educational leaders, at all levels, began to look increasingly to Washington, D.C., for national leadership and for support of new or expanding school improvement programs of all sorts.

However, from the late 1960s on, the socioeconomic conditions were gradually reversed. Energy became expensive; the international trade balance became consistently more unfavorable. American productivity fell below that of many other industrial nations. Stagflation characterized the economy. At the same time, births declined, thus reducing the number of students in schools and the number of parents with a direct stake in education. Meanwhile, at the other end of the age distribution, the proportion of older citizens began to grow, thereby increasing demands on government resources to support medical, social security, and other programs for the elderly.

Moreover, the central government's social engineering solutions to problems of equity and social justice played themselves out. Public support for social programs diminished. In addition, evaluations of federal programs, although sometimes overly premature or too narrow in their definition and measurement of success indicators (see Section IV.D.), often declared these federal programs to be failures--or at least ineffective or inefficient. Money to support social and educational programs decreased in order support the war in Vietnam and to meet many other governmental needs. So the 1970s saw the federal government and the states both turn increasingly to regulation. A punitive-stick rather than a carrot-reward style came to be a more prevalent aspect of governmental intervention in education.

But centralization grew and, with it, increasingly intrusive regulation. By the late 1970s, the burgeoning costs of social programs cut deeply into federal and state budgets. Deficit spending and increased taxes were the governmental response. At the same time, there was a retrenchment in foreign affairs. Soviet intervention in Afghanistan and the inability of the U. S. to rescue hostages in Iran caused many to reappraise America's international power. A build-up of American military power seemed essential and became a top item on the federal policy agenda. Meanwhile, at state and local levels, a similar growth of government and expansion of state and local services imposed increasing tax burdens, leading to taxpayer revolts in the form of far-reaching tax-limitation initiatives. Finally, enormous economic shifts on the national and international level, accompanied by decreasing productivity, massive deficit spending, and tight money policies designed to slow inflation contributed to the creation of a worldwide financial recession that has directly and indirectly affected the national, state, and local economies throughout the United States for the last several years. As a consequence, the environment in which American education finds itself in the 1980s is vastly different than it was in the 1960s and 1970s. Today the financial condition of education in most states and localities is grim. Although real income for public elementary and secondary schools in the United States increased by 40 percent during the 1970s, it has declined each of the first three years in the 1980s. While contending with rising costs and increasing taxpayer resistance, state and local governments now confront an additional problem: a recessionary economy that, in some regions and localities, has already reached depression proportions. The depressed economy not only means smaller federal, state, and local tax revenues, but also has increased welfare and other social service costs. Public education, which has long found at least modest suport at state and local levels, now finds itself contending with many other pressing social interests for a share of increasingly constrained state and local budgets.

Adding to these problems are federal cutbacks for education and the development of a distinctly different federal education policy. The 1980s brought to Washington, D.C. an administration and a Congress that were both disposed to establish a basically different approach, not only to American education, but to many other social programs, that calls for federal spending cuts, program consolidation, deregulation, and a significantly diminished federal role. Although this approach is part of the agenda of the current administration, in our view the 1980 national elections signaled a needed fundamental change that appears to have far deeper social, economic, and political roots than a mere change in party power. Proposition 13 in California, along with a wave of similar tax-limitation legislation in other states, a dramatic decline in trust in government and other social institutions --including schools, and an increasing general malaise over a declining "stagflation-type" economy are but a few of the many indicators of deep-seated public dissatisfaction. These attitudes and acts have prompted a far more critical and conservative approach to government, at all levels, in an effort to redefine policies to better match the massive changes in regional, national, and international socioeconomic circumstances and the social and political mood of the voters. We seem to have entered an era where past approaches have become suspect, if not completely distrusted.

At the federal level, the major political issues seem to be concerned with: establishing a stronger role for the United States in foreign affairs;

creating a favorable environment for business and industry so they may develop and restructure themselves to provide the jobs and goods needed to promote private- and public-sector growth; decreasing the involvement of the federal government in the details of domestic affairs; reducing the scope and role of governmental bureaucracies; and establishing a sense of leadership and direction that can encourage state and local governments to assume greater roles and responsibilities for directing and supporting domestic programs so that the federal government can turn its attention and allocate its resources to higher-priority national and international political, economic, and military issues. In light of these salient federal policy concerns, education is no longer seen or treated as a priority federal issue. Federal cutbacks, program consolidation, and federal deregulation in education and many other social program areas are already in progress, and there is little prospect that these new directions for federal domestic policy will be soon reversed. Moreover, given the now massive demands on federal resources to support current social security, defense, and economic development program costs, the federal government is essentially broke, whether Democrats or Republicans are elected. Hence the continuing squeeze on federal domestic and discretionary programs is likely to continue, regardless of near-term political trends or changes in party power.

Although the national and regional economies may improve eventually, thereby diminishing the stress on many state and local budgets, fiscal demands in other public sectors, such as health, welfare, and public safety, are expected to continue to grow. Consequently, even with an improved economy, public education can expect to face a continuing challenge at state and local levels to win and maintain support that goes beyond the most austere and basic levels of funding. In this environment, "growth" models of educational change and renewal will need to be replaced with "austerity" and "efficiency" models that are far more closely attuned to state and local political, economic, and cultural contexts and to the cross-pressures of many special-interest groups inside and outside the education sector.

These major political, social, and economic trends have both negative and positive implications for educational dissemination in general and for linking agents and agencies in particular. The negative aspects loom large and appear grim. However, in our view, the picture is not so totally bleak as it may first appear.

It is now obvious that there will be significantly less federal funding available to support programs employing information specialists, external facilitators, linking agents, or technical assistance and training specialists. Here are some specifics. Many major federal technical assistance programs, e.g., Desegregation Assistance (ESAA), ESEA IV-C, Teacher Corps, Women's Educational Equity, became victims of the Educational Consolidation and Improvement Act (ECIA) consolidation. One of the largest networks of educational linking agents, the National Diffusion Network (NDN), was almost included in the ECIA Chapter 2 consolidation. It now survives as a mandated part of the Secretary of Education's ECIA Discretionary Fund. If NDN continues, it is likely that the NDN State Facilitators will be asked to do more, with substantially less money. In the short run, support for the more than one hundred funded NDN Developer/ Demonstrator (D/D) projects will be reduced appreciably. In the long run, the pool of candidate D/Ds may slowly disappear, due to the fact that most of the federal funds supporting locally developed innovations were consolidated into ECIA Chapter 2. The state and local Title IV-C projects were also consolidated into ECIA Chapter 2. Local schools may still use their ECIA Chapter 2 funds to pursue any of the purposes of the programs consolidated into Chapter 2, but the sums of money are no longer concentrated in schools and districts in amounts permitting the creation of significant innovation projects. The state-run Title IV-C innovation networks have also been affected severely by the loss of categorically concentrated IV-C funds. In most states, ECIA Chapter 2 state set-aside funds may be insufficient to maintain these state networks. Finally, as we have noted, the NIE Research and Development Utilization Program and the RBS Local School Improvement Program were both experiments that are no longer in operation. Thus, among the various programs that we have classified as pursuing Problem-Solving Process/Program Implementation strategies, the only surviving agents are those in the NDN and in some state Title IV-C networks that may continue to receive portions of the ECIA Chapter 2 state set-aside funds. Continued support for both groups of agents is highly uncertain.

The problems for linking agents supporting information-use assistance or technical assistance strategies is somewhat different, since they are less directly affected by ECIA Chapter 2. Although the NIE is now phasing out the several cohorts of states still receiving five-year State Dissemination Grants, some aspects of these SDGP projects have been institutionalized; but state, intermediate, and local support for the thousands of linkers associated with this program may be significantly diminished due to critical shortfalls in state, intermediate, and local education agency budgets. Moreover, federal- and state-supported networks of human agents serving in compensatory, bilingual, special, vocational, and other education areas are also threatened by federal cuts and by state and local shortfalls (McDonnell and McLaughlin, 1982; Hood, Cates, Hering & McKibbin, 1982). Depending on their capacity and service orientations, some state and intermediate education agencies have made remarkable efforts to maintain technical assistance services in the face of federal cutbacks and state and local shortfalls. But many have already been forced to make deep reductions in programs and staffs, while many others are anticipating painful cuts. It appears that state and intermediate agencies are attempting to maintain provision of at least the most-wanted and needed technical assistance services to local schools, but often with significantly reduced staff and resources.

Related problems exist at the local level. All the studies in our review that provided outcome data clearly point to the important, and usually positive, contribution to school improvement outcomes made by teachers, principals, and central office staff. However, many school districts are now reducing their administrative and support staffs. Many central-office positions have been eliminated, along with vice-principal positions, guidance counselors, school librarians, and others. Elimination of these positions has placed many additional duties on remaining central-office administrators, school principals, and teachers. These circumstances mean that there are fewer persons, fewer dollars, and less time to devote to school improvement activities. However, an even more profound set of organizational and environmental effects is now troubling many educators. The protracted years of enrollment decline and the loss of public respect for teaching as a profession, coupled with increasingly severe budget problems and reductions in staff, have reduced opportunities for promotion and advancement. Along with work overload, these factors have taken their toll in significantly lowered morale and espirit, job burnout, and lost self-esteem. As educational agencies have been forced to shift their priorities in order to maintain core services, organizational incentives have shifted to discourage any form of innovative activity that is not time- or money-saving. And when these teachers and administrators turn to the larger knowledge base (whether it be ERIC, NDN, a library, a college of education course, or a state education agency consultant) they find relatively few practice-relevant solutions that, at the same time, deal effectively with school improvement "basics," cut costs substantially, or result in significant savings of labor or time, and yet represent practical, low risk alternatives to current practices.

These are the realities that both external and internal linking agents will face in most schools in the 1980s. In the current climate, for many educators the words "school improvement" may mean simply either providing a significantly better education for K-12 students at no real increase in cost or providing some "satisficing" level of education at much reduced real cost. Neither our knowledge inventory nor the skills and experience of our linking agents are especially well qualified to confront either of these conceptions of school improvement. Too much of our attention has been directed to "add-ons," "pull-outs " and special categorical projects that have, given the prevailing environment and change philosophies of the past 30 years, too often assumed an abundance of external (federal and state) resources and a reasonable amount of local slack resources (money, motivation, time, organizational incentives).

Three trends appear to have negative implications for linking agents for the next several years. First, there are likely to be markedly fewer categorical or programmatic dissemination and school improvement projects, primarily due to cuts in federal funds and to shortfalls in state and local funds. Second, there may continue to be a slow, but cumulative, erosion of institutional and organizational capacity to produce, disseminate, and use new knowledge to improve schools, except in limited, high-priority areas. As we have noted, this capacity will be reduced due to significant federal, state, intermediate, and local reductions in resources, including money, staff, time, energy, and organizational and professional incentives. Third, there will continue to be a marked shift in educational agency priorities toward an emphasis on provision of core services and maintenance of the traditional, long-established, and instutionalized agency functions. Given these trends, external assistance to schools, whether based on information-use assistance, technical assistance, or more comprehensive problem-solving/program implementation strategies, is most likely to obtain support and be successful only if it addresses some combination of three essential ingredients: it faces and competently helps solve critical educational problems, it is low-cost or cost-saving, and it is low-risk (politically, organizationally, and professionally).

These trends and likely conditions also have a positive implication. The needs for school improvement in the sense we have just described are pervasive. Assistance that addresses these needs successfully will be supported, not as experiments, or demonstrations, or special categorical projects, but as highly valued, if not essential, support services needed to reform, renew, and maintain educational operations. Restructuring the external and internal technical assistance capability of educational agencies to perform these functions will not be easy or painless. It is highly likely that in many, if not most, cases, information assistance, technical assistance, and more comprehensive change-support activities will become part-time roles, performed by educational administrators, program specialists, teachers and professors, and others, rather than full-time jobs performed by specialists. However, it is our contention that these roles will be necessary and that an increasing number of educational administrators, support specialists, and other educational professionals will perform them as responsible educators who must cope with the challenges and demands of educating citizens for life in a highly dynamic, post-industrial, information-processing society. In such a society, school improvement may eventually no longer be viewed as a collection of individual, interesting "ideas" and "innovations" to be episodically and singly adopted, implemented, and then incorporated or discarded, but rather as an intrinsic and continuous aspect of the adjustment and renewal functions of a dynamic, adaptive process oriented schooling institution.

Is this outcome even possible, let alone likely? We believe it is. The primitive patterns for its success are to be found in the studies we have reviewed. The Linking R&D with Schools (RDU) study found that high-quality, R&D-based or validated practitioner-developed products helped to create significant school-level effects on instructional and organizational change, with multiple benefits. However, the fit between the product and the local site was even more important. Products and practices developed outside schools can be implemented in classrooms with little or no substantial adaptation if schools carefully define their local needs, if school staff follow a systematic process to identify a product or practice that not only meets those needs, but fits the local context, and, of course, if a product meeting those requirements is available. External asistance by competent professionals was an important contributor that affected the degree and scope of use and the quality of many other outcomes. External agents providing assistance fell into two distinct categories: generalists, who provided sustained assistance for staff mobilization, need definition, problem-solving, and continuing support activities; and specialists, who provided substantive technical assistance and training preparing for, and implementing, new practices. Money was also important. Although there was no relationship between the total cost of the school improvement activities at a site and the site's success, some "risk" money was important. Money was a motivator. It helped to get things going. It was particularly important to provide for released time, so that staff could be involved in the process of selecting a solution and in planning for implementation. Moreover, although total amount of money showed no relation to degree of success, too much dependence on outside funds tended to have negative impacts; but there was a significant positive relationship between success and the percentage of total costs borne by local resources. Strong local financial, organizational, and personal commitment all helped to foster successful implementation, with positive benefits.

The Dissemination Efforts Supporting School Improvement (DESSI) study is particularly remarkable for its finding that the scope of change being attempted is related both to the success that can be expected and to the kind of assistance that is appropriate. One of the major DESSI conclusions is that, if the new practice is not very different from the current practice, the only thing a disseminator can do is to give teachers information about the new practice and then leave them alone. Beyond this, there was no discernible way to enhance the outcomes, and the presence of an outsider may rapidly become negative. However, in schools where use of the new practice represents a major change from existing practice, two fairly independent processes seem to be at work. One, operating at the level of the individual teacher, results in change in classroom practice. The other, operating at the school level, results in organizational change and institutionalization of new practice. And, as in the RDU study, the DESSI study also clearly demonstrated that successful school improvement efforts involved a constellation of key actors: teachers, principals, central office staff, and external agents, each playing a critical, complementary role. The DESSI study also found that the effective transfer of new practice is far more an interpersonal than a strictly informational enterprise. Because this study investigated contrasting dissemination strategies, ranging from much face-to-face, at-the-school-site interaction, to no interpersonal interaction at all, it strongly corroborated earlier findings about the significant and powerful effect of interpersonal influence.

Although small-scale change can be initiated by individual facilitators, major changes typically were most successful where several internal and external sources of interpersonal assistance were organized. This brings us to a final point; namely, to note that, especially in the NDN and RDU projects, networks of external assistance resources were established and marshalled selectively to supply the particular needs of different sites over various phases of change. In both cases, time, measured in years rather than months, was required to establish efficient networks of support operations and to achieve potent, major change in school site operations. When the costs of these school improvement support efforts are compared to the costs of daily operations of schools, they are not particularly large and appear to pay off in terms of many benefits.

However, neither the technical assistance support networks themselves nor the change projects they engender in schools are likely to be developed and supported solely by individual operating schools . Hence we confront two related dilemmas--where will the leadership and resources to establish and maintain school improvement support networks come from, if the federal government relinquishes this support role? And how can such support operations be made more efficient, effective, and relevant to current needs?

Thus, in looking back over these implications, we conclude that support for linking agents and agencies is substantially less certain than it was in the 1970s. However, we also conclude that the effectiveness of external assistance provided by linking agents, particularly those providing problem-solving/ program implementation assistance, has been proven. Educational agencies, at state, intermediate, and local levels will need to decide whether and how they might work together to build and maintain external assistance networks. If these networks can face and respond effectively to the critical needs of schools in the 1980s, there will continue to be an important role for linking agents to serve in school improvement efforts.

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VOLUME VI: Dissemination at the National Institute of Education: Contending Ideas about Research, Practice, and the Federal Role by Charles L. Thompson

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VOLUME VIII: The Infrastructure of Innovation: The Case of the National Diffusion Network by James A. Taylor

VOLUME IX: Implications for Action by A. Michael Huberman, David P. Crandall

VOLUME X: Executive Summary by David P. Crandall, Susan F. Loucks

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* These publications were not available for the review of DESSI reported in this volume. The list is provided to assist readers who may wish to consult the DESSI final reports.

Publications List*

A STUDY OF DISSEMINATION EFFORTS SUPPORTING SCHOOL IMPROVEMENT (DESSI)

David P. Crandall and Associates. People, Policies, and Practices: Examining the Chain of School Improvement, Volumes I-X. Andover, MA: The NETWORK, Inc., 1982.

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VOLUME II: Portraits of the Changes, the Player, and the Context by Susan F. Loucks, Pat L. Cox, Matthew B. Miles, A. Michael Huberman

VOLUME III: Models of Change by Joyce Ellyn Bauchner, Pat L. Cox, William Schmidt

VOLUME IV: Innovation Up Close: A Field Study in Twelve School Settings by A. Michael Huberman, Matthew B. Miles, with Beverly Loy Taylor, Jo Ann Goldberg.

VOLUME V: Dissemination for School Improvement: An Analysis of Nine Federal Education Programs by Glenn Shive, Jeffrey W. Eiseman

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